The Electrical Industry's Weekly Magazine

April 23, 1956

Electrical World

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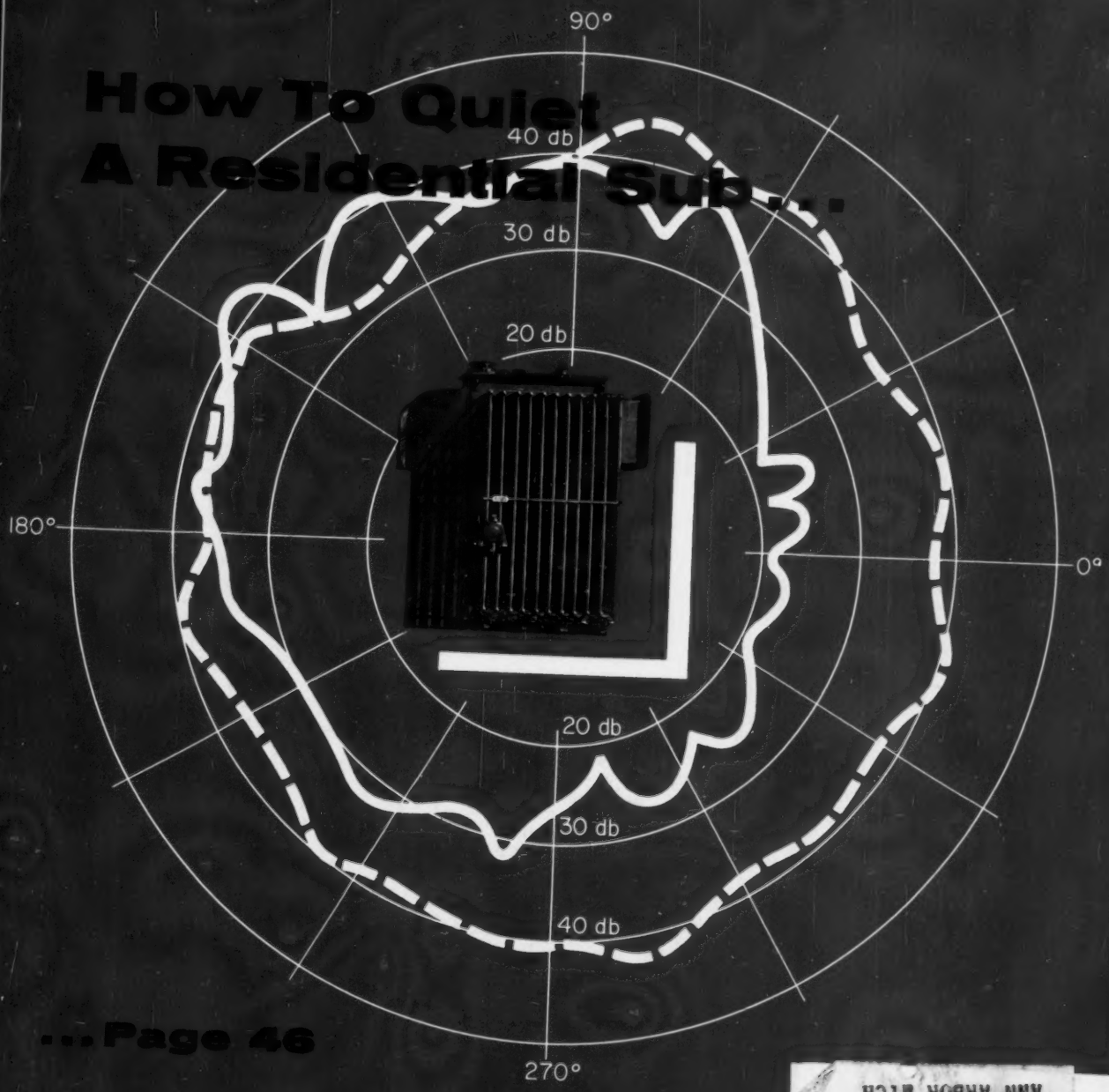
How To Quiet A Residential Sub...



...Page 46

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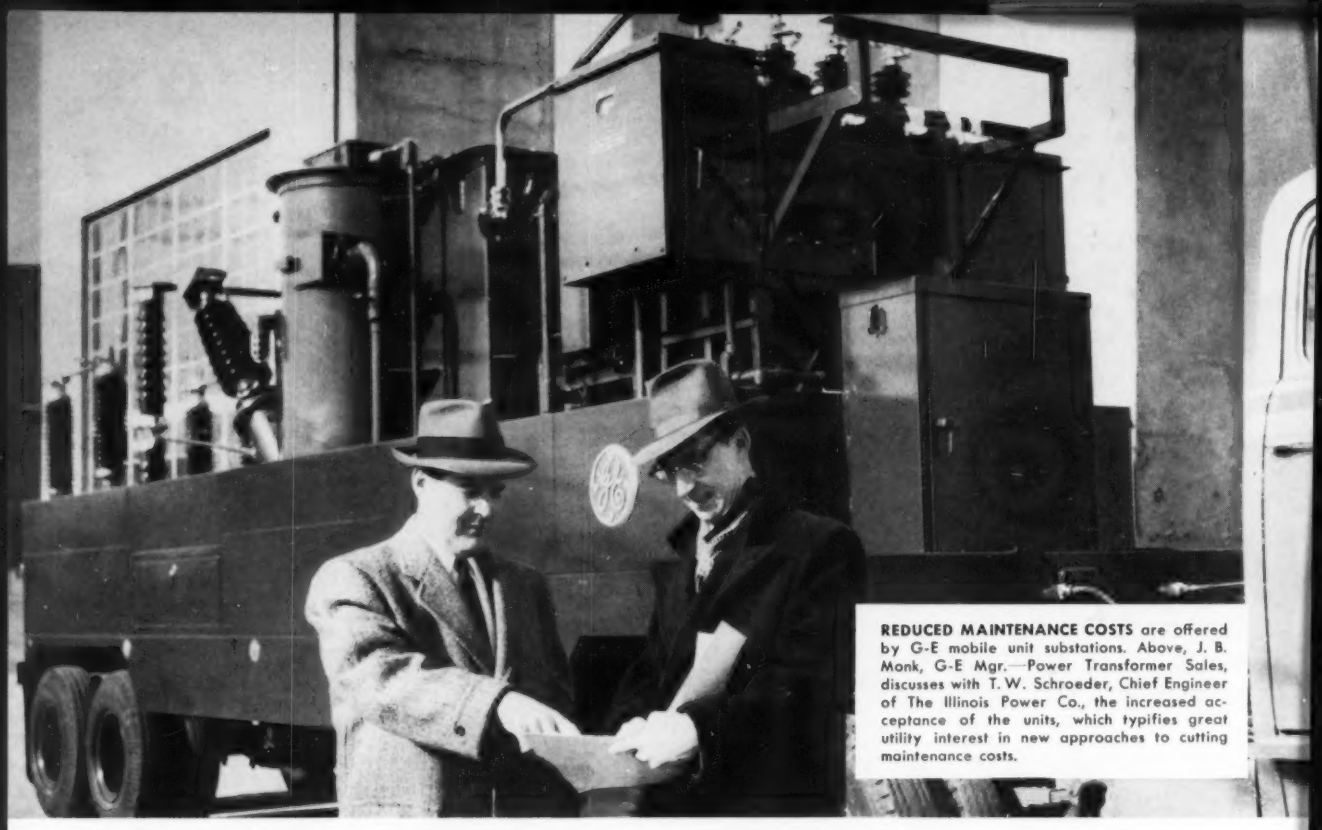
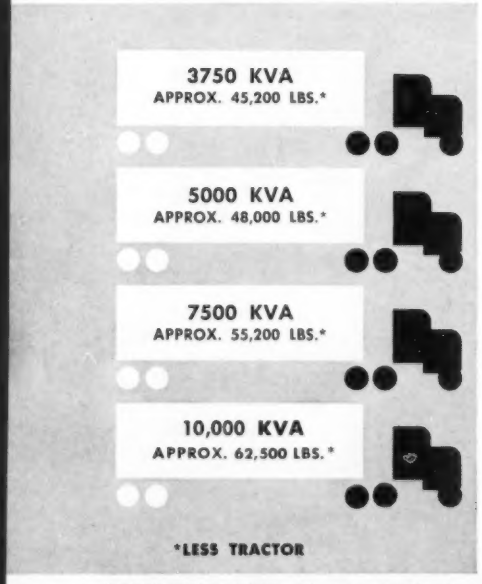


REDUCED MAINTENANCE COSTS are offered by G-E mobile unit substations. Above, J. B. Monk, G-E Mgr.—Power Transformer Sales, discusses with T. W. Schroeder, Chief Engineer of The Illinois Power Co., the increased acceptance of the units, which typifies great utility interest in new approaches to cutting maintenance costs.

Mobile substations typify utility trend to lower-cost maintenance



MOBILE SUBSTATIONS will open new frontiers for cutting expenditures for many companies. G-E units are available in a variety of ratings from 1000 to 10,000 kva. Mobile transformers have been built as large as 25,000 kva.

Recent activity indicates that many utilities have made considerable progress toward reducing maintenance costs through the development of systematic and mechanized approaches to over-all system maintenance. Rapid acceptance, for example, of mobile unit substations for normal equipment servicing, as well as for emergency service, on subtransmission systems has helped reduce routine expenditures on many systems. To further increase these savings by permitting mobile units to replace a greater number of substations, General Electric recently disclosed that it is extending the range of available ratings to 10,000 kva.

PRODUCTIVE MAINTENANCE

Impetus may be added to the growing popularity of the "Productive Maintenance" concept, a program of sensibly scheduled equipment outages, by this extended range of mobile unit substations. Upkeep expense is reduced through the use of mobile substations and mobile transformers as substitutes for regular units in need of service, thus permitting work to be done during regular working hours. Along with recent developments in automation and mechanization in the areas of generation, transmission and distribution, improvements in maintenance point up the utility industry's steady progress in reducing costs.

EXPANSION AND CONTINUITY

As customer demands for more uniform service continue to grow, and as systems continue to expand, utilities will find that often both problems can be eased greatly by sound maintenance planning. For further information on General Electric's mobile substations and how they can help streamline your company's approach to low-cost system maintenance, write for publication GEA-4415, General Electric Company, Schenectady 5, N.Y.

MORE POWER TO AMERICA 301-316

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ELECTRICAL WORLD

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Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

VOL 145 No 17 **April 23, 1956**

SUBSTATIONS

HOW TO QUIET A RESIDENTIAL SUB.....J. R. Wilson 46

DISTRIBUTION

STEEL ENCLOSURES SERVE HOME AREA.....H. S. Smith 43

SALES AND SERVICE

BUILD RURAL LINE EXTENSIONS THROUGH 'SELF-HELP' PROGRAM.. 38

MEETING

EDISON ELECTRIC INSTITUTE SALES CONFERENCE..... 16

MANAGEMENT

Industrial Relations 55
Business Outlook 60
Finance and Regulation..... 63
Statistics 66

EDITORIAL AND COMMENTARY

Editorials 5
In the Industry..... 62
Technical Notes 62

INDUSTRY NEWS

Electrical Week 6
Current Events.....8, 15, 26, 41
News About People..... 31
Meetings Calendar 36
Manufacturers and Markets... 56

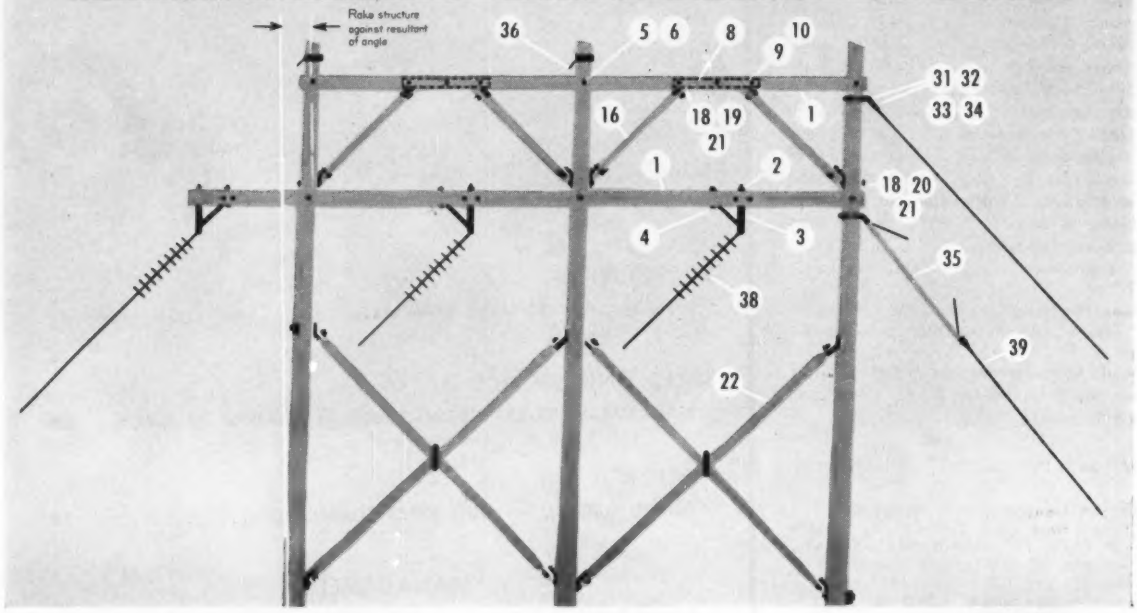
• • •

COMING NEXT WEEK—Maintenance is important to every electric company and to all phases of operation. An industry report on "Modern Maintenance Methods" will be packed with constructive suggestions.

SMALL ANGLE STRUCTURE TYPE NO. 706

NORMALLY USED FOR ANGLES OF 4° — 15°. ADAPTABLE FOR VOLTAGES FROM 69 TO 154 KV

DRG. REF#	QUANTITY	DESCRIPTION	DRG. REF#	QUANTITY	DESCRIPTION
706	3	Pole	21	7	MF locknut ⅞"
1	4	Crossarm	22	2 sets	Cross base w/fittings, clamp, ⅞" pole bolts, and curved washers
2	3	Spacer fitting w/mfg. bolts			
3	3	Swinging angle bracket			
4	3	Saddle w/mfg. bolts	31	4	Pole band
5	6	Stud bolt ⅞" w/2 washer nuts	32	4 pr.	Connecting link
6	12	MF locknut ⅞"	33	1	Guy roller
8	2	Filler block	34	1	Machine bolt ¾" x 2½"
9	6	Stud bolt ¾" w/2 washer nuts	35	1	Wood guy strain insulator
10	12	MF locknut ¾"	36	2	Suspension clamp for static wire
16	4	Knee brace			
18	7	Machine bolts ⅞" w/sq. nut	38	As required	Suspension insulators and fittings
19	4	Flat washer 4" sq. x ¼", 13/16" hole	39	—	Guying material
20	2	Curved washer 4" sq. x ¼" 13/16" hole			



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EDITORIALS

St. Lawrence Power for Vermont

The Vermont Public Service Commission this week is scheduled to hear a petition for creation of a new corporation which would distribute power in the state from the St. Lawrence project. This petition, sponsored by Central Vermont Public Service Corp, is envisioned as a cooperative effort by electric companies in the state for transmitting power to all suppliers from the big New York hydro project. As of last week no formal opposition to the petition was in sight.

Two other Vermont companies, Green Mountain Power Corp and Citizens Utilities Co, are actively considering participation in the new corporation. Both have joined with Central Vermont in arranging for preliminary study and planning.

Electric companies in Vermont do not face the same sort of threat from public power that is present in some other states. The proposal for distributing St. Lawrence power is made in the interest of serving customers in the most efficient and economical manner. To the utilities in the state this is a job to be done. They will find a way to do it.

We commend those who are leading this effort. They are offering the kind of planning and initiative that the industry must display if it is to meet its ever-growing responsibilities.

"Public Utility Companies"

The word "independent" now takes its place along with "taxpaying," "investor-owned," and "business-managed," to describe electric companies. All of these are a contribution toward defining the responsibility and nature of the privately owned utility. They were chosen with care and have been effective.

However, it seems to us that the final phrase has not yet been composed. Some descriptive phrase is needed to emphasize the public service and broad ownership aspects of electric companies.

A number of individual companies have managed to get "public service" into the company name. There is ample legal precedent for calling the electric companies "public utilities." They are thus described in judicial opinions from the Supreme Court down. What is more, the regulatory bodies of many states are called "public service" or "public utility" commissions, and they rarely exert control over government-owned utilities.

We see no reason to shy away from the word "public." And we can see numerous opportunities for the use of such terms as "public utility companies" or "public service companies."

Problem Becomes an Opportunity

Public relations is an unusual profession. Sometimes an amateur in the field hits on a idea that puts the professional to shame. Take the case of Neil Cunningham's service crew in Southern California Edison Co's Ontario district (EW, April 16, p 86).

When school children from the nearby Monte Vista school milled around a construction project, Cunningham didn't shoo them away. Instead he arranged for a full scale demonstration of the linemen's skill.

Thus when the crew set a transformer pole near the school yard a week later, an audience of 70 youngsters and a teacher watched the entire operation. Cunningham and his crew explained the purpose of the transformer and some of the methods of hanging it.

The job became the subject of the youngsters' class work. Cunningham and his crew received numerous notes of appreciation for their efforts.

You'd have to look a long way for a better example of on-the-job public relations. The crew turned a problem into an opportunity and made friends in the process.

ELECTRICAL WEEK

OUTPUT

Week ended April 14
10,918,000,000 Kwhr
Up 13.7%

Atomic Energy Commission requirements — 1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 10.4%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
April 14	+13.7	+12.4	+9.0	+19.7	+10.9	+15.5	+10.7	+13.7	+11.5	+7.6
April 7	+12.6	+14.5	+7.7	+17.3	+9.4	+13.2	+11.3	+11.0	+16.9	+6.6
Mar. 31	+12.1	+11.3	+8.2	+17.7	+8.9	+11.2	+12.6	+8.5	+13.2	+8.6

Seasonally Adjusted Index 214.6 Week Ago 212.8 Year Ago 188.6

Issue's Highlights—REA Administrator Ancher Nelsen will run for Minnesota governor; Daryl Dunn, Kansas farmers housing administrator, may be next REA head . . . Senate votes down TVA's use of power revenues for new John Sevier plant unit after House approved plan . . . Washington's Gov Langlie opposes Tacoma City Light's Cowlitz project; draws city officials' fire.

The Meetings Circuit—At Northwest Public Power Association annual convention in Spokane, Dr William A. Pearl, BPA Administrator, noted that with 100,000 kw of interruptible power reserved for new industry, supplementary steam generation would allow new industry to locate in Pacific Northwest pending delivery of firm power from new projects . . . Dr William Dettmer, power manager, Kaiser Aluminum & Chemical, cautioned that improved steam generating efficiency is reducing hydro's lure to industry . . . Alex Radin, APPA general manager, forecast court decision by June on FPC's license to Idaho Power for Hells Canyon development.

At Northwest Electric Light & Power Association Engineering & Operating Section meeting, Vancouver, Tom Connelly, vice president, Josslyn Manufacturing, said future price of wood poles would depend on competition for wood products. Summer of 1957 may see better supply of poles . . . Higher voltage secondaries will come through working of natural forces, said R. W. Bullard, Ebasco Services. Experimental use of 265/460-v nominal system by utilities, plus cooperation by manufacturers, will help solve small problems that higher secondaries produce, he added.

Britain to Try New Reactor—Britain's Atomic Energy Authority is designing what will be a new type of atomic power station for that country: the "sodium graphite" reactor. Up to now reliance has been placed on gas cooled units. First of new stations, expected to be completed by late 1959, will have 100,000-kw capacity.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire—SEC Chairman J. Sinclair Armstrong has opposed Senate bill to exempt utilities from holding company regulation because of their joint sponsorship in atomic power development ventures. But Armstrong indicated willingness to go along with tighter version of legislation which would permit exemption for experimental operations, but which would require SEC registration for profitable ventures.

Senate public works subcommittee has approved Kerr Bill (S3338) to prevent 40% increase in Southwestern Power Administration rates. SPA request for rate hike has been withheld pending completion of hearings.

Power for Aluminum—Southern Indiana G&E will operate Alcoa's 375,000-kw coal-fired plant for aluminum company's new $80 million smelter to be built east of Evansville on Ohio River. Interim power will be furnished by SIGECO.

Bond & Share Diversifies—Electric Bond & Share has acquired American Cyanamid's subsidiary Chemical Construction Corp for undisclosed sum. Chemical Construction (Chemico) does world-wide business.

Labor Settlement—Virginia E&P has signed with IBEW for 8% wage increase and adjustments of inequities in certain job classifications. The one-year contract is effective until March 31, 1957.

TVA Proponents Plan Campaign—Tennessee Municipal League has endorsed plan of Citizens for TVA to "tell the TVA story to all sections of the nation." The "all-out campaign" is aimed at telling "truth about TVA and the fairness of the TVA self-financing plan."

Atomic Forum Meets—Possibilities for nuclear power plants in areas having abundant fossil fuels are good, Detroit Edison Pres Walker Cisler told Atlanta meeting of Atomic Industrial Forum. Fossil fuel could then be transformed into chemicals of greater value, he pointed out . . . Use of nuclear fuel will not change basic philosophy of rate making, said J. H. McCarthy of Michigan PSC. Research and development costs are true operating expenses, he said.

ABOUT PEOPLE IN THE INDUSTRY

Nation's electric power industry may well be called on for 123% increase in output in next ten years, GE Pres Ralph J. Cordiner told annual stockholders meeting. "The demand for electric power is now expected to double in the next eight years and to quadruple in the next sixteen," he said. Efforts to educate public to greater electricity usage aim for average home use increase of 2½ times to 7,500 kwhr by 1966, he noted.

Citizens Utilities' shareholders have shown overwhelming preference for receiving future dividends in stock rather than cash, according to Pres Richard L. Rosenthal. With 74.9% of holders favoring new stock dividend series, Rosenthal said this "acceptance is positive evidence that investors are eager for a financing method which will avoid the inequity of dilution and carry benefits of long term capital gains . . ."

More News About People page 31

Ancher Nelsen taps the grass roots on his Minnesota farm near Hutchinson

Pushing Ike's policies at home . . .

REA's Nelsen Will Run for Minnesota Governor

- **As "an Eisenhower aide in the field", REA administrator will enter state race where heavy Democrat opposition is expected**
- **Daryl Dunn, Kansas administrator for Farmers Home Administration, may be next REA head; he has Nelsen's support**

Ancher Nelsen, administrator of the nation's rural electrification program for the last three years, is joining Interior Secretary Douglas McKay to carry President Eisenhower's power policies into state elections. Nelsen will run for governor of Minnesota, campaigning as "an Eisenhower aide in the field."

Dunn Tops List for New Post

Of the several names mentioned for the REA post, one seems to be a front-runner. He's Daryl Dunn, Kansas administrator for the Farmers Home Administration. He's an Eisenhower appointee with a record as an REA state director at Topeka, rural electric co-op director (Arkansas Valley, Hutchinson, Kan.), and cooperative bank official. Nelsen is supporting Dunn who is up for approval before Agriculture Secretary Ezra Benson.

Nelsen has had the support of Eisenhower and of Agriculture Secretary Benson since President Eisenhower announced his appointment in April 1953. But his policies, which tightened up on loan requirements and urged closer cooperation with all power suppliers, have been the subject of controversy and of repeated attacks by public power and rural cooperative groups.

Nevertheless, under his supervision the REA has whittled down its back log of loan applications. Recent REA statistics point up the fact that, whereas a few years ago the cooperatives were concerned primarily with initial generating and transmission construction work, they now deal with REA on funds to heavy up their lines and improve their systems.

Nelsen will run on this record. But he will also cite to the voters of his home state the fact that he was born in Renville County, Minn., and has owned and operated a farm near Hutchinson since 1924. And he will emphasize his past activities in 4-H Club work, the Farm Bureau, rural electric, insurance, and elevator cooperatives, the legislature, and the lieutenant governorship of that state.

The new candidate, who has not yet made public his desire to obtain the post, will need all the ammunition he can fire, for he will be bucking the powerful Democrat-farmer-labor coalition which sent Minnesota's Democratic Sen Hubert Humphrey to Congress. D-F-L can be expected to back for re-election the incumbent governor, Orville Freeman, who may run again.

CHARLES J. FAIN
Stepping from NRECA to REA

In the Republican primaries, Nelsen may find himself fighting former Republican Gov C. Elmer Anderson of Brainerd, and State Auditor Stafford King, the only high Republican official still holding office in the state.

Who Nelsen's successor will be is still unknown. But an announcement should be made soon, for Nelsen must leave in time to meet Minnesota's July 23 deadline for filing of candidates for the state elections.

Fain Named New REA Assistant

On the eve of his departure, Nelsen reached high into the organization which has heckled him most, and pulled into the REA a new assistant. He is Charles Fain, 36-year-old attorney and former Missouri state legislator who was made assistant general manager of the National Rural Electric Cooperative Association last year. He joined NRECA in February 1954 as a legislative assistant.

Fain, whose new title is assistant to the REA administrator, resigned from NRECA on April 12 because he felt he could "better serve the rural electric program at REA" and because of policy differences with NRECA officials. Fain disagreed basically with NRECA's national office when the co-op group refused to support legislation to authorize the 1-million-kw Upper Colorado River Storage Project without language guaranteeing construction of federal transmission lines to rural co-op load centers.

Wheeling Concept Supported

By then assistant general manager of NRECA, Fain felt that this abandonment of the wheeling concept was not in the interest of the nation or of the co-ops, particularly in view of the fact local utilities had offered to wheel Upper Colorado power to area co-ops under established wheeling procedures.

Fain also charged the NRECA staff with failure to concentrate its efforts on solving the most pressing problems of the co-ops—proper management, power use difficulties, and relations with the local public.

Fain says he is convinced Nelsen has done a "marvelous job under tremendous odds" and that he endorses the REA administrator's policies.

As Nelsen prepares to leave REA, the agency readied papers approving a loan to finance construction of a $10-million, 22,000-kw nuclear power reactor in Nelsen's home state.

The REA loan, for $2,980,000, will be accompanied by a contribution of $6,860,000 from the Atomic Energy Commission, which will support design, construction and operation of the plant. AMF Atomics, Inc, is designing the closed-cycle boiling-water reactor.

Basic to his decision to grant that loan was a determination by Nelsen that Section 4 of the Rural Electrification Act of 1936 permits loans for experimental power projects. In the past, Nelsen and his predecessors have interpreted this section strictly, requiring that REA borrowers show that their facilities are capable of repaying the federal funds invested in them.

Should Nelsen's approval of a loan to finance a reactor in his home state enter into the Minnesota gubernatorial contest as a political brickbat, it must be remembered that pressures to approve that loan were initiated by NRECA and other organizations which have opposed Nelsen's policies from the start.

Congress Splits on TVA Unit

Senate wants to appropriate money for Sevier Plant unit; but House rejected appropriation, okayed power revenue plan

Congress has indicated its willingness to permit the Tennessee Valley Authority to install a new 180,000-kw steam unit at its John Sevier Plant. But a split developed over where TVA should get the money to pay for it.

Several weeks ago, the House refused TVA's request for $3.5 million in appropriations to pay for initial orders on the $28-million unit. But it did approve TVA's spending its power profits to pay these costs, as well as initial orders for several other generating units for other steam plants.

While this was going on, Comptroller General Joseph Campbell issued a warning that TVA was embarking on a $178-million expansion program without Congressional approval (EW, April 9, p 9).

Recently the Senate heeded Campbell's warning and voted against TVA's spending power income to finance installation of new steam units. Instead, the senators agreed to appropriate $3.5 million to pay for the Sevier unit orders.

What will happen now is anybody's guess. TVA will probably get its Sevier unit, for Congress recognizes that a substantial power shortage threatens the valley area (EW, April 2, p 22). Besides, the matter is covered in a supplemental appropriations bill which provides money for many federal agencies to bolster the half-spent 1956 budget. It's the kind of a bill which cannot be amended on the floor of either house.

The bill is now before a conference committee made up of members of the House and Senate appropriations committees. They must come to a compromise before it can be referred to both bodies for final action.

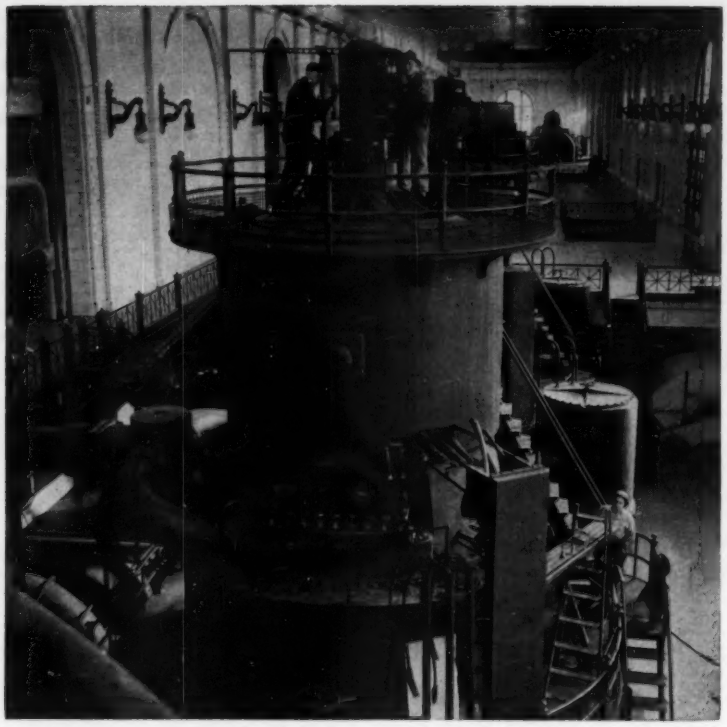
TVA area supporters said they expect the House members, led by House Appropriations Committee Chairman Clarence Cannon (D-Mo.), to insist on giving TVA permission to spend its power revenues on the Sevier unit. On the other hand, they see little likelihood of the Senate conferees backing down on their version.

Someone has to give, or the supplemental bill will be tied up indefinitely, and this will not be permitted to take place. Who will give, however, was not known as EW went to press.

New Electric Code Set for Washington State Ok

Work has been completed on a new Washington state electrical code governing installation and maintenance of electric supply and communication lines. This was announced recently by Ed Sorger, supervisor of safety for the State Department of Labor & Industries.

Public hearings on the code probably will be held in July. Few objections are expected as the code was prepared by a group of electrical industry representatives appointed by Sorger. The new code will be presented to the 1957 state legislature.



Fisk Station Retires Veteran Generators

An old-style, 12,000-kw vertical turbo-generator (above) is one of three such veteran power producers being dismantled at Commonwealth Edison Co's Fisk Station to make room for a giant 305,000-kw unit recently ordered by the utility.

The last of Fisk's vertical units, the machines ranked among the world's largest when installed in 1909, six years after Fisk went into operation as America's first all-steam turbine generating station. In recent years they have been used only for peak load and emergency purposes.

The new generator will use steam at 2,000 psi pressure and 1050 F, compared to the older edition's 200 psi and 513 F. While the verticals used about five pounds of coal to produce one kwhr, the new unit will use less than a fifth of that amount.

BPA Okayed to Wheel Power from Priest Rapids

Bonneville Power Administration has been authorized to wheel power generated at the Priest Rapids project, being built by the Grant County (Wash.) PUD. A recent legal opinion by J. Lane Morthland, regional interior solicitor, clears the way for contracts between BPA and the PUD for power transmission.

Glenn A. Smothers, manager of the PUD, has been advised of the decision and forecasts quick action toward transmission contracts.

The opinion, he said, shows "that it was the intent of Congress in the Priest Rapids Act of July 27, 1954, to have the project developed . . . as part of the comprehensive plan for . . . the Columbia River.

"This means the project should be integrated with federal projects . . . through use of the federal grid, and it was not the intent of Congress that the licensees should be forced to construct duplicate transmission facilities."

Contracts, according to the opinion, may be written for power interchanges or wheeling.

Cowlitz Hassle

. . . continues as Langlie opposes cost, output, capacity of proposed dams; Tacoma officials answer the charges

Municipal officials at Tacoma, Wash., are busy refuting statements by Gov Arthur B. Langlie of Washington and his power advisor, Holland Houston, opposing Tacoma's 460,000-kw Cowlitz River project.

Langlie, referring to a state fisheries department lawsuit which may halt construction now under way on 160,000-kw Mayfield Dam and to a 1949 state law prohibiting dam construction on the Cowlitz, recently said he had "no other course but to insist that the rights of the fisheries department . . . be sustained."

Langlie's and Houston's objections to the project were:

- Full capacity of Mayfield could not be utilized by Tacoma until 1967 and combined capacity of Mayfield and Mossyrock until 1975.
- Because of the stream's seasonability, Tacoma's two proposed dams would produce almost as many kilowatts at times as Idaho Power Co's proposed three low dams on the Snake River but would have an output of only 1.5-billion kwhr a year compared to 6-billion for the Idaho dams.
- Installed peaking capacity at Mayfield would cost $215 per kw, said Houston, as compared to $72 to $100 for addition of generators at existing dams.

Countering Langlie's opposition, E. K. Murray, special counsel for Tacoma City Light, pointed out that the state supreme court has held that the 1949 law does not apply to the Tacoma project, since the city applied for an FPC license before legislative action was taken.

Only issue now before the court, he declared, is whether the project would unlawfully interfere with public navigation on the river.

Vermont PSC Merger Near

Negotiations by Central Vermont Public Service Corp to absorb Woodstock Electric Co are expected to be completed soon. The Woodstock firm has about 2,000 customers.

mounts quickly, easily
in existing 25-kvar brackets

This new Westinghouse power capacitor for high-voltage outdoor applications has the same mounting dimensions as the 25-kvar unit. Only height has been increased. This means more kvar capacity on limited pole space, twice the capacitor rating in the same rack. Here, certainly, are worth-while savings in installation or replacement cost per kvar—in time, space and labor. In stacking, too, over-all rack space can be cut 50%.

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6 million kva of high-voltage transformers boost utility economy

At year's end, 53 extra-high-voltage power transformers in the 330-kv range had been bought by the utilities, from Westinghouse, to set an industry record of leadership for the third straight year. Of these, nearly 2,000,000 kva were produced last year, 2,750,000 kva were built in 1954 and more than 1,000,000 kva were made available in 1953. Most recently, two 400,000-kva autotransformers, largest in the world, capped this performance.

The challenge for this record—America's ever-increasing demand for electric power—is one that Westinghouse is proud to meet.

Westinghouse performance means, too, advanced design improvements *now* for bigger loads, higher voltages, increased system flexibilities *as they are needed*. Performance-proved innovations such as Form-Fit® design and Shell-Form construction; improved, forced-oil cooling; higher levels of insulation performance; and outstanding service from condenser bushings are Westinghouse "look-ahead" features . . . engineered to make conversion and transmission of large power blocks more efficient, reliable and economical.

Impulse testing of *all* these units on the production line is an added guarantee of trouble-free performance from the first split second on-line.

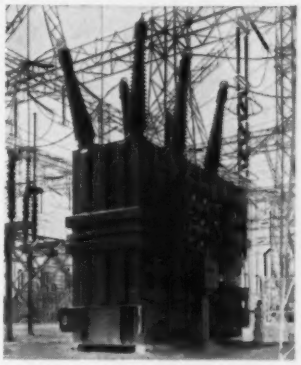
Higher goals are welcome at Westinghouse as milestones—on the way to equipping America's Utilities Today, for Tomorrow!

America's electrical needs are symbolized by this 400,000-kva autotransformer now in operation at the Tanners Creek plant of the Indiana & Michigan Electric Co. It is the greatest concentration of power conversion equipment in one unit ever applied to any system. J-97193

YOU CAN BE SURE...IF IT'S

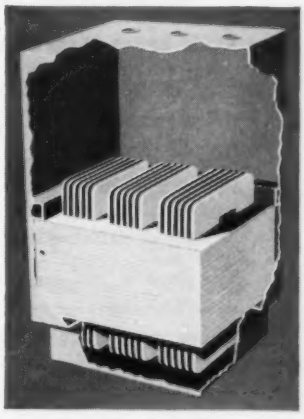
Westinghouse

At 400,000 kva . . . new, higher transformer capacity



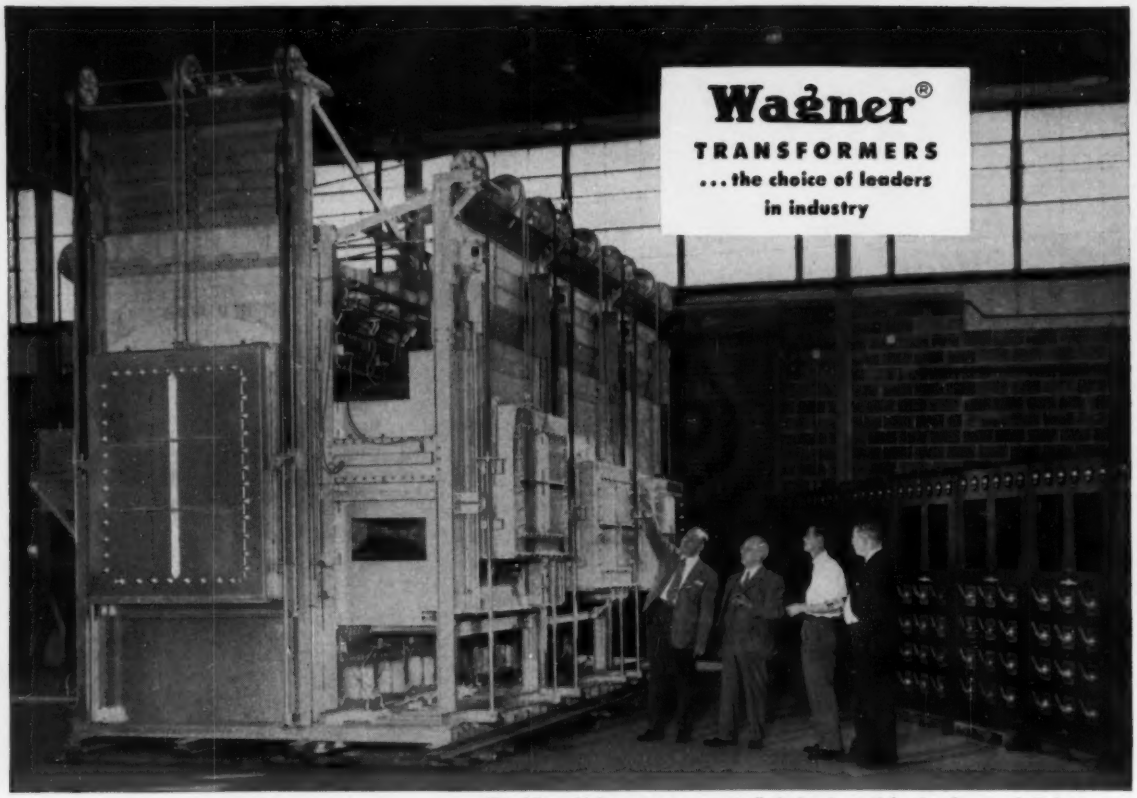
The unique Westinghouse Shell-Form design means that coils are placed inside the core iron—natural, vertical cooling arrangement improves thermal characteristics; voltage oscillations are reduced for better dielectric qualities. This and other exclusive design features of Westinghouse extra-high-voltage transformers permit the same operating reliability and even greater system economies and flexibility as with equipment of much lower capacity.

Form-Fit design saves space, weight



Heart of the Westinghouse high-capacity, low-weight design is the Form-Fit construction. Snug-tailored, rugged, it reduces the volume and maintenance of coolant oil, permits upright shipment. It's a fact: Westinghouse Form-Fit transformers—in all sizes—are smaller and lighter per kva than any other design.

A wealth of experience in transformer design and production is available to you now through your nearby Westinghouse sales engineer; or write to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.



This 55-ton high-temperature, controlled electric steel forging furnace, built by C. I. Hayes, Inc., gets its power supply through Wagner Dry-Type transformers.

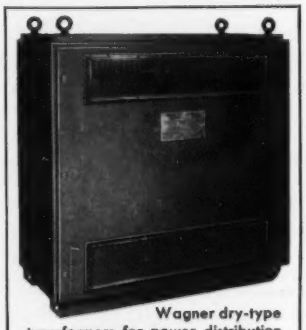
Wagner Dry-Type Transformers supply power for the world's largest electric steel forging furnace

In North Grafton, Massachusetts, the Wyman-Gordon Company has placed in service the largest electric steel heating forging furnace ever built anywhere. It has a capacity of 10 tons of steel billets.

The plant, largest single unit in the USAF heavy press program, makes plane components of unprecedented strength, lightness and dimension on 50,000-ton, 35,000-ton and other hydraulic closed die forging presses.

Operating temperatures as high as 2400 degrees Fahrenheit may be maintained with a connected load of 600 kilowatts, supplied to the furnace through eight Wagner Dry-Type transformers.

Wagner Dry-Type transformers were selected for this job because they supply dependable power right at the load. You can spot them *close* to your loads and save money in terms of shorter runs of copper, reduced line losses, and lower installation expenses.



Wagner dry-type transformers for power distribution are available in single-phase, 1 through 500 kva; and three-phase, 3 through 2000 kva ratings. Write for Bulletin TU-57 or consult the nearest of our 32 branch offices.

Wagner Electric Corporation
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

WT56-A

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

TOURING NEWSMEN look over scale model of The Dalles Project on Columbia River

Politics Nailed as Shackle on Hydro

Kinsey Robinson says power projects "blockaded" by political opportunists and Thomas W. Delzell scores "attempt to push . . . federal power down our throats"; remarks climaxed a press tour of twenty Northwest power projects

A delegation of newspaper and magazine writers recently concluded a two-day aerial tour of the Pacific Northwest as guests of the member utilities of the Pacific Northwest Power Co and Idaho Power Co. They surveyed 20 power projects on the main stem of the Columbia River and the Snake, Clearwater, Clark Fork, and Lewis tributaries.

The tour concluded with a press conference in Portland, at which time leading utility executives of the Northwest outlined the power situation in the region.

Kinsey M. Robinson, president of Pacific Northwest Power Co, told the group that responsible public and private agencies in the region were trying their best to build projects in order to meet the growing demands of Northwest consumers, but that they were being delayed and unnecessarily "blockaded" by political opportunists who envision an all-federal utility system in the area.

Portland General Electric Co Chairman Thomas W. Delzell said neither his company nor any other in the region opposed federal development per se.

"What we object to," he said, "is the deliberate attempt on the part of some persons to force the philosophy of federal power or nothing down our throats."

Delzell called the solution of the Northwest's power problem an "all-hands" job, and noted that the federal government had never been able to provide all the power needed in the region.

Partnership Importance Stressed

"We need real partnership here," he said. "That means the maximum effort of private companies, public agencies and the federal government. If the obstructionists continue to be successful, the region will suffer a crippling power shortage within ten years. . . ."

The party started out from Boise, flying over the Snake and the sites of the 2-million kw three-dam Idaho Power Hells Canyon program, and the PNP Mountain Sheep-Pleasant Valley project to make a brief stop at Lewiston. Later they were shown the proposed 244,000-kw flood control and power project site at Bruces Eddy on the Clearwater. The tour traced the Flathead-Clark Fork power projects: Kerr Dam (185,000 kw), Thompson Falls (40,000 kw), Noxon Rapids (400,000 kw), and Cabinet Gorge (230,000 kw).

Other highlights included a swing over Grand Coulee and the Columbia Basin reclamation project to Pendelton by way of Ice Harbor (310,000 kw); a grand tour of The Dalles (1,256,000 kw) after flying over McNary dam (1,127,000 kw) and the proposed John Day (1,105,000 kw). The final leg of the trip took the party over Bonneville (570,000 kw) and then down Lewis River past the Yale and Merwin plants with 233,000 kw, and over the sites of the proposed Swift hydro project (295,000 kw), and Meadows (75,000 kw).

GE's W. V. O'BRIEN, left, presented LBE citation on behalf of manufacturers. O. R. Doerr, EEI's Commercial chairman, accepted award

At EEI Sales Conference . . .

More Push Urged for Lagging Residential Sales

With "Live Better . . . Electrically" and "Housepower" optimistic utilitymen gear up for drive. Two more selling jobs seen: Automation and free enterprise

"Best sales meeting in years. With 'Housepower' and 'Live Better . . . Electrically' we've got something we can really sink our teeth into for a change."

Thus spoke one utility sales executive after Edison Electric Institute's 4½-day Sales Conference in Chicago last month. The two big promotions fairly dominated the show and much of the between-sessions talk was centered around ways to carry them out. As one long-time conference goer put it: "It's a little like the old days when we used some hard sell and showmanship."

But those attending also got a couple of other sales jobs tossed into their laps by conference speakers: Automation and free enterprise. EEI Pres Harllee Branch, Jr, sounded the gun in the conference's opening speech.

On free enterprise, he said: "Today we must sell not only our service but our way of doing business. We are far from winning the battle for preservation of the free enterprise system. It will not matter much to us if the average residential use of electricity increases to 6,000 or 8,000 kwhr if, in the meantime, the business has been taken over by the government." On automation: "It will pave the way for more and more uses of electricity. It is our duty to seek out aggressively these new uses."

Westinghouse Electric Corp Pres Gwilym A. Price and J. W. McAfee, president, Union Electric Co of Missouri, carried these points further. Price urged utility sales people to become the spokesmen for automation. "It desperately needs interpreters and defenders," he said. "No other single American industry is so well fitted as the electric industry." Automation must come, he continued, if we are to stay in the competitive race with other nations and to make up for the serious labor shortage that the nation faces in the coming decades. The change, however, will be natural and gradual.

McAfee noted an invisible competitor—the block which is continually seeking to socialize the business. "We can survive and prosper," he said, "only by continuing to operate in high gear. With all the things (in our business) that invite complacency, I am amazed that we do not have more of it."

McAfee offered some suggestions for making the sales department more valuable to management:

1. Devise standards to measure better a sales program's effectiveness.

2. Continue to work for better load factor (Union Electric estimates 20 kwhr per month added to each residential customer's off-peak load would improve load factor 1%).

3. Develop customers who can provide a substitute for the expensive reserve facilities utilities must maintain to carry seasonal and other peaks.

To help sales executives meet the new responsibilities called for by management, Edwin Vennard, EEI's vice president-elect, outlined a ten-year selective selling program aimed to raise present rates of return by 0.5%. Some points:

- Residential load factor will drop from 48% now to 46.9% in 1965. With a balanced load building program load factor can be raised to 48.3%.
- Correct your residential rates. Without offsets air conditioning costs 2¢ to 3¢ to serve; yet some utilities are selling way below this. Vennard's suggested pricing: 2½¢ per kwhr for first 1,500 kwhr per kw per year; 1½¢ per kwhr for additional energy.
- Give the customer a discount for good load factor,

Sales Tips from General Session

- **Sell your way of business as well as your service**
- **Double your domestic load by 1960—get behind "Live Better . . . Electrically" and "Housepower"**
- **Sell automation—the electrical industry stands to benefit greatly**

"Be automation's spokesmen and its defenders"—**WESTINGHOUSE's PRICE**

"There is no conflict with other promotions"—**HOUSEPOWER's GEORGE**

"Amazed there isn't more complacency in our business"—**UE's McAFEE**

make him pay a penalty for a low one.

• Two-zone refrigerators and lighting are the best load-builders. Under his program lighting load per home could be raised to 1,600 kwhr per year by 1965 instead of a predicted 950 kwhr.

• To sell water heaters, the rate must be low. To make money at a low rate, the heaters must be controlled.

As for cost, Vennard said his program would require that sales budgets be upped from a present 1.7% of gross revenues to 2.5%.

Seen as the instrumental tools in residential load building were, of course, the "Housepower" and "Live Better . . . Electrically" programs. General Electric Co Vice Pres W. V. O'Brien urged utilities to get behind LBE and aim at doubling their residential loads by 1960. He pointed out that domestic load increases haven't been keeping pace with others of late. There was a decline from 11.7% in 1954 to 11.1% in 1955 while industrial and commercial sales showed substantial rises. His recommendations:

1. Stage regular LBE information meetings with trade allies.

2. Sponsor LBE tie-in campaigns with dealers.

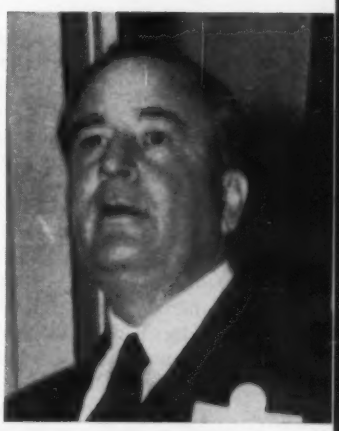
3. Encourage manufacturers' participation.

"Housepower," EEI's million-dollar wiring campaign, is not a certification program and is not in conflict with other wiring promotions, declared E. O. George, chairman of EEI's Wiring Promotion Committee. George, with the help of Commonwealth Edison Co's Thomas Ayers, Union Electric's Merrill Skinner, Duquesne Light Co's George Ousler, and Westinghouse's Betty Furness, gave a run down of "Housepower's" promotional plans and how they're materializing.

Manufacturer help was reported highly gratifying and arrangements are going ahead for TV commercials next fall on NBC's "Home" and "Today" shows. Local identification on these commercials will be made available to individual utilities. Plans for advertising in newspaper Sunday supplements have been dropped, however. All local promotion will be left up to the individual company. The campaign gets rolling this month with announcement of the $100,000 wiring contest in the May issue of Better Homes & Gardens magazine.

To get better penetration with their promotions, Elmer L. Lindseth, president, Cleveland Electric Illuminating Co, called on utilities to "put their wiring problems in the same hopper" with other housing problems that plague

"Put wiring in same hopper with other housing problems"—**CEI's LINDSETH**



"Correct your residential rates, improve load factor" —**EEI's VENNARD**

"We're far from winning the free enterprise battle" —**EEI's BRANCH**

AT FARM LUNCHEON: Herbert Pike, center, Iowa farmer who toured Russia last summer, addressed group. Chairman Bud Moss presided. At left is G. S. Young, Kansas City P&L

the nation. Speaking for the American Council to Improve Our Neighborhoods (ACTION), Lindseth said 15 million homes are urgently in need of repair and that $100 billion must be spent on housing maintenance in the next 10 years.

What all these load building plans could mean in terms of sales was spelled out by Fischer Black, publisher and editor, Electrical World. "If we keep going at the rate of the last 15 years the industry's total sales won't just be 1.3 trillion kwhr in 1970 as forecast but could hit 2 trillion kwhr annually," he said. Industrial sales could reach 1 trillion kwhr instead of a predicted 570 billion, commercial sales could more than triple today's 81 billion kwhr, and residential sales could go well above the present conservative estimate of 462 billion kwhr.

"For instance," Black continued, "if all the 20 million new homes built between now and 1970 were all-electric we would reach 600 billion kwhr. If the families who own two cars had all-electric homes we could come near doubling residential in one fell swoop. And if we could get all other competitive fuels out of the home, residential load alone would equal 1½ times total use for 1970."

Better Servicing Needed

There was a note of caution, however, from Utility Financial Analyst Harold H. Young of New York's Eastman, Dillon Co. "Utilities should give more attention to the servicing of appliances. Manufacturers and distributors have fallen down woefully in many cases. Utilities cannot hope to keep selling appliances if people are going to be unhappy after they get them into their homes."

A big contributor to expected future load growth could be electric space heating. It was accorded a prominent place in the day-long sales group meetings which preceded the general sessions. Before the Commercial group, Lowell R. Mast, Electromode division of Commercial Controls Corp, predicted one million completely electrically heated homes, factories, and commercial establishments by 1960. On the other hand, Edwin L. Wiegand Co's Fred Kreiser, in the Residential session, said five to six million electrically heated homes are what would be needed in 1960 just to compensate for the 37⅞ million hp of cooling to be added by that time.

Mast asked utilities to help correct false customer impressions of house heating costs by furnishing prospects with accurate information. "Going from oil or gas to electricity as a fuel," he said, "is less of a step to make than the one that existed when people began to step up from other fuels to gas."

Full reports and summarized sales hints from these and other group sessions follow:

COMMERCIAL SALES: Not Enough Money and Manpower to Do the Best Job

Money and manpower for commercial selling and promotion are being stretched too far. This was pointed out by two speakers—Ebasco Services' William L. Byrne and Restaurant Supply Manufacturer Milton Maidenberg—at the Commercial group meeting.

Byrne cited an Ebasco survey of 34 companies which showed they had reduced average sales expenditures from 1.9% of commercial revenues in 1940 to 1.5% today. At the same time the sales force has been reduced from an average 7.3 salesmen per 10,000 customers in 1940 to six today. Lighting, he found, has suffered most during the period. Whereas it received 62% of commercial promotion effort in 1940, it gets only 51% now.

Dealers Unhappy with Utilities

Speaking for the Dealer-Utility Relations Survey Committee of the Food Service Equipment Industry, Maidenberg chastized electric utilities for their lack of unified action in tapping the $16-billion food service business. Equipment dealers, he said, indicated in a recent survey that they are not entirely happy with their relationships with utilities. Some typical complaints:

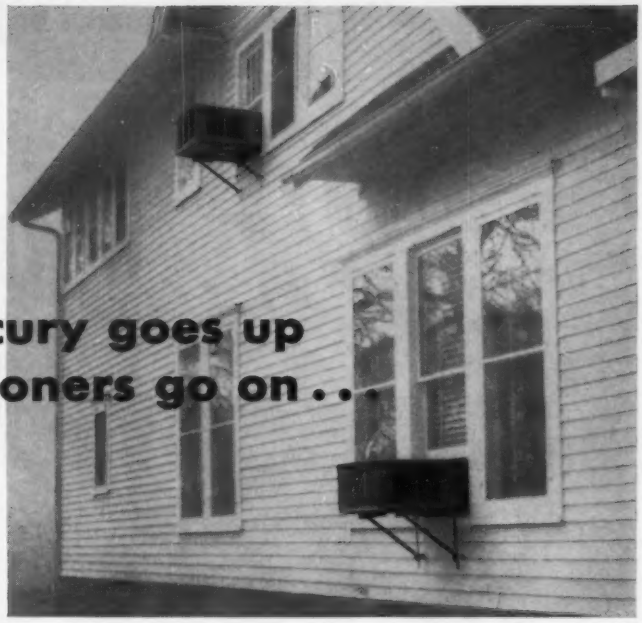
"Utilities are not interested in us making a profit" . . . "They don't work as closely with us as do the gas people" . . . "Not enough cooking specialists to help us do an effective sales job" . . . "Our salesmen find it much easier to sell gas equipment as no technical knowledge is involved."

Maidenberg said utilities must develop continuing programs with dealers if they are to get their share of the market now dominated by gas. He offered ten suggestions for better dealer cooperation and bigger sales (box page 22).

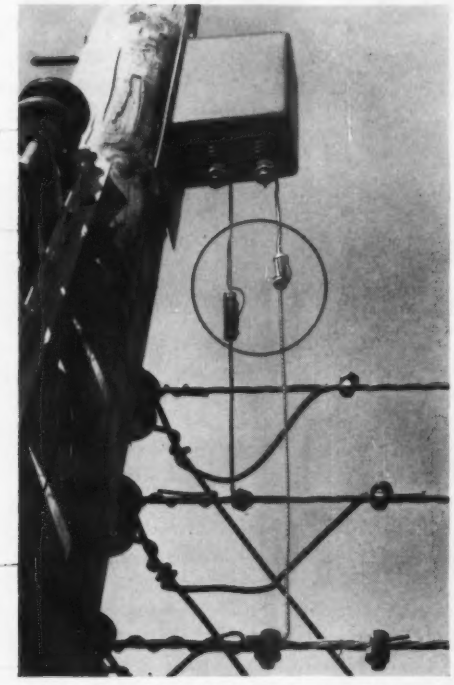
Lighting, another relatively undeveloped load builder, got its share of attention, too. American Gas & Electric Co's John Snyder told how his company's "Operation Main Street" program is building new business and economic development for the small city of Cambridge, Ohio. "The system-wide program," said Snyder, "aims

(*Continued on page* 22)

COMMERCIAL SESSION: W. Byrne, Ebasco; L. Mast, Electromode; G. Lahodney, Detroit Ed; C. Bouders, Indianapolis P&L



When the mercury goes up and air conditioners go on . . .



CHANCE CARTRIDGE TYPE SEMAPHORE FUSES, on a secondary capacitor, completely protect the secondary system and equipment if the capacitor fails, and permit service to be maintained until the capacitor is replaced.

STAY INTACT AFTER OPERATION: Chance Secondary Fuses do not fall apart or hang down after they blow and therefore cannot short-circuit other lines.

CAN BE CO-ORDINATED: For greatest possible protection on your entire system, Chance CTS Fuses can be co-ordinated with primary fuses. Curves showing minimum melting and maximum total clearing time current characteristics are available on request. For performance curves, or more complete information, write to A. B. Chance Company, Centralia, Mo.

. . . your secondary systems should have the protection of

CHANCE CTS indicating fuses

Here's secondary fusing that gives you bargain-price protection from "heat storm" overload problems caused by air conditioning and summer's other increased uses of electricity. Chance CTS Secondary Fuses isolate failed capacitors or faulted sections, protect transformers, and help to maintain customer service—all at very low cost.

A red plastic indicator on the Chance CTS fits tightly against the fuse cartridge until the fuse element ruptures. The flag is then released automatically, and instantly springs away from the cartridge. *Your linemen and patrol crews can easily spot this flag from the ground.*

The fuse that WAVES A RED FLAG

to signal an outage or capacitor failure

A·B·CHANCE CO·

Chance Type CTS Secondary Fuses are available in a complete range of sizes from 5 to 200 amps inclusive. Sold by leading Electrical Wholesalers everywhere.

CF56-11

Super power transformers pace utility expansion

"Big Power" Transformer goes to Long Island

THIS 125,000-kva Allis-Chalmers power transformer is in operation at the Far Rockaway generating station of the Long Island Lighting Company. It is a typical example of the power transformers being built by Allis-Chalmers for utilities all over the country.

As power needs grow, utilities are adding more and more of these big transformers to their systems. Allis-Chalmers has helped in the development of new transformer engineering and construction techniques to aid utilities in solving their expansion problems.

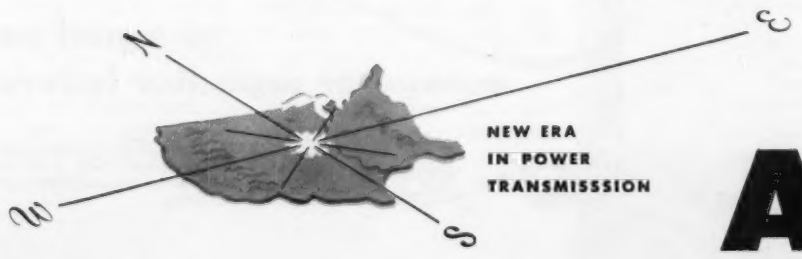
Here are some of the features worth noting:

Quiet. This transformer was built to operate at 76 decibels. Normal sound level for a transformer of this type would be at least 85 db. Continuous noise research includes a 10-acre outdoor proving ground, mobile testing equipment, and extensive laboratory facilities for testing and analysis.

Cool. This transformer is cooled by *Electro-Coolers*, consisting of air-to-oil radiator-type heat exchanger and pump, which provide high efficiency heat transfer.

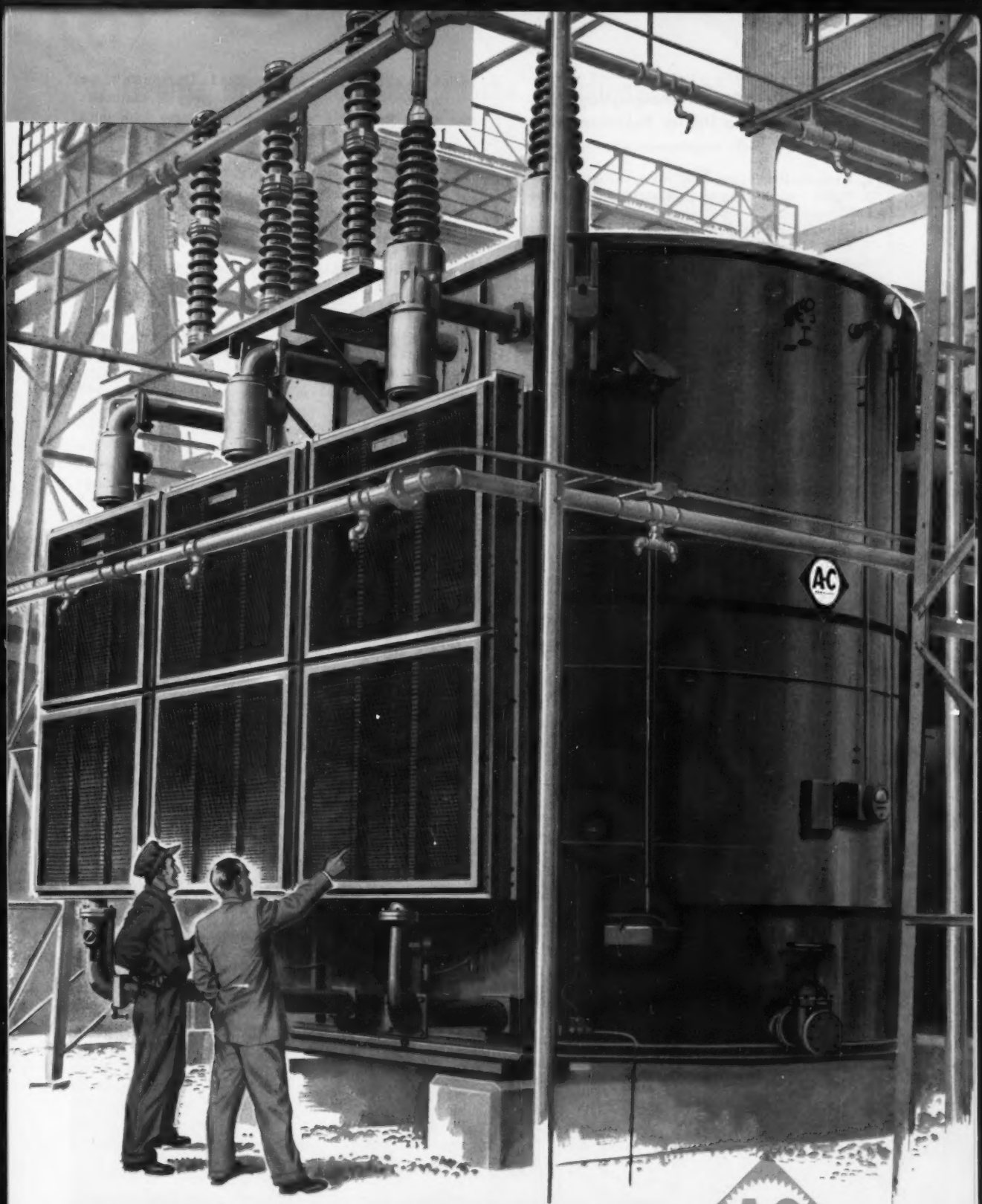
Corona-Free. Like all Allis-Chalmers power transformers, it is corona-free. Regardless of size or number of parts, the creeping deterioration of corona can never shorten the useful operating life of an Allis-Chalmers power transformer.

An Allis-Chalmers representative will be glad to discuss this or other power transformer developments with you at your convenience. Call the nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-4913



NEW ERA
IN POWER
TRANSMISSSION

ALLIS-



CHALMERS

A-C
ALLIS CHALMERS

10 Ways to Bigger Cooking Sales
(and Improved Dealer Relationships)

1. Always make calls on prospects with dealer salesmen.
2. Keep dealers informed of rates, wiring costs, etc.
3. Follow up installation; check wiring, customer satisfaction
4. Maintain a Service Department
5. Own "loaner" equipment
6. Bear all or part of wiring costs on new equipment
7. Sponsor or co-sponsor food service demonstrations
8. Don't allow domestic equipment to go in places where commercial equipment belongs.
9. Make mailings to school lunch people, architects, hotel operators, restaurant owners, etc.
10. Let the prospect use equipment on trial

(*Continued from page* 18)

not just to build immediate load for us but to attract new industry to our communities by fostering civic rehabilitation and modernization." Since it got moving in Cambridge, Ohio Power Co has added 75 kw of lighting load in the business area with that much more in the planning stage. Requests for lighting layouts have been coming in droves, and the company figures its new EAR already at more than $3,000.

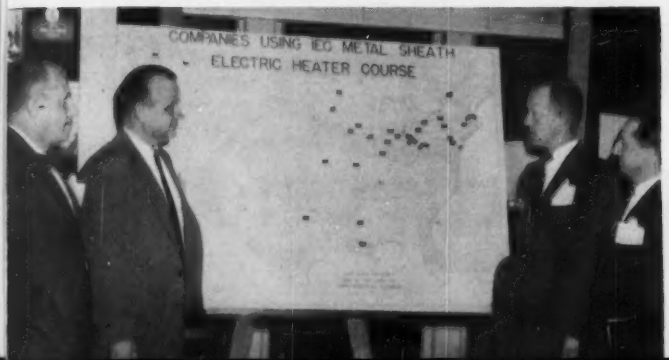
Success of the National Lighting Bureau's Certification program in the Rhode Island area was attested to by Narragansett Electric Co's William Freudigman. In first seven months 130 commercial jobs were certified. Hopes are high for getting a $350,000 chunk of lighting business out of a $1 million appropriation recently made by the Rhode Island Assembly for school rehabilitation.

Still another lighting success story came from western Pennsylvania where 17,963 kw of commercial-industrial lighting business and EAR of $5.78 million have been added by Duquesne Light Co in four yearly campaigns. Back of this success, said H. H. Johns, managing director of Electric League of Western Pennsylvania, has been a strongly unified promotional effort by trade allies, coordinated and directed by the league.

In spite of the results being achieved, one ingredient was seen to be sadly lacking—adequate market research. "Unless we get busy and start finding out a few basic facts about our customers, we are going to lose out in the battle for the consumer dollar," declared G. L. Lahodney, Detroit Edison Co.

He offered three factors that must be considered in setting up effective market research: **1.** Determine where you are now—how many and what types of customers you serve; their type, size and location; the saturations and characteristics of the loads you serve. **2.** Determine where you should be going—decide how best to increase kwhr use and at the same time fill the valleys in the load curve. **3.** Find out the best way to get there—know your customers problems and sell the benefits.

INDUSTRIAL SESSION: W. L. Thompson, E. L. Wiegand Co; J. F. Morton, New Orleans PS; H. W. Memmott, Connecticut L&P; Roy Wages, Georgia Power, check spread of IEC courses



INDUSTRIAL SALES: New Sources of Competition Are Making the Going Rougher

Our competition is not asleep declared Roy W. Wages, Georgia Power Co, who warned of competitors who are grabbing off profitable industrial accounts. Among them: Government agencies and new and improved devices such as steam, oil, and gas turbines, absorption air conditioning, and chemical methods of humidity control. "But one of the most dangerous of all," he continued, "is the many inexperienced, ill-trained private consulting engineers who have come upon the scene in recent years." Wages suggestion: "Get on the job first and sell the prospect."

W. L. Thompson, Edwin L. Wiegand Co, offered one answer to tightened industrial competition—metal sheath heating. To the user, he said, it offers low initial cost ($6 to $34 per kw), long life (10,000 hr even at temperatures of 1,500 F), and 100% conversion to heat. To the utility it provides high load factor and high annual revenue (ranging from $20 to $60 per installed kw). The metal sheath heater, said Thompson, is an extremely low cost way to build EAR.

Industrial Sales Tips

- **To beat competition, get to the customer first**
- **Don't overlook the industrial in-plant feeding market**
- **Push metal sheath heating to build low-cost EAR**

Another field for sales exploitation is industrial in-plant feeding. Dan Robertson, Jr, Illinois Bell Telephone Co, said an estimated 26,000 business and industrial cafeterias spend more than $1 billion annually for food, equipment, and utilities. Illinois Bell alone serves 30,000 meals a day, owns 56 ranges, 30 ovens, 103 refrigerators and freezers. Asked Robertson: "Have you in the utility business exploited our business as well as you might?"

Development and use of promotional sales tools were discussed by J. F. Morton, New Orleans Public Service, Inc. Supplementing this was a study of commercial-industrial sales techniques used by 38 electric utilities. Presented by Arkansas Power & Light Co's W. M. Shepherd, the study lists marketing methods used by individual companies plus catalogs, films, training courses and other promotional materials offered by various manufacturers, trade associations and business magazines. Copies are available from EEI Commercial Department, 420 Lexington Ave, New York 17.

(*Continued on page* 24)

If George Washington Crossed the Allegheny River Tonight . . .

His way would be lighted with POWER from

Pole Star

DISTRIBUTION TRANSFORMERS

In December of 1753, Major Washington and his guide, Christopher Gist, were returning to Virginia after having delivered a message to a fort near present-day Erie, Pa. The two men built a log raft on which they attempted to cross the Allegheny River at a point several miles above where that river joins the Monongahela River to form the mighty Ohio. Their raft upset in midstream, but the two men were able to swim to an island, where they spent the night before making a second, successful attempt to cross the stream.

Pole Stars are available in all single phase distribution sizes from 3 through 500 kva, in voltages through 67,000 volts; Protected Pole Stars, from 3 through 100 kva, in voltages through 14,400 volts.

It has been over two hundred years since George Washington — who was then a major in the Virginia Militia — made his near-fatal crossing of the Allegheny River, at what is now Pittsburgh. If Washington were to cross the Allegheny tonight, using the Washington Crossing Bridge that now occupies the site of his earlier drenching, his approach to that span would be lighted with power from Pole Star distribution transformers.

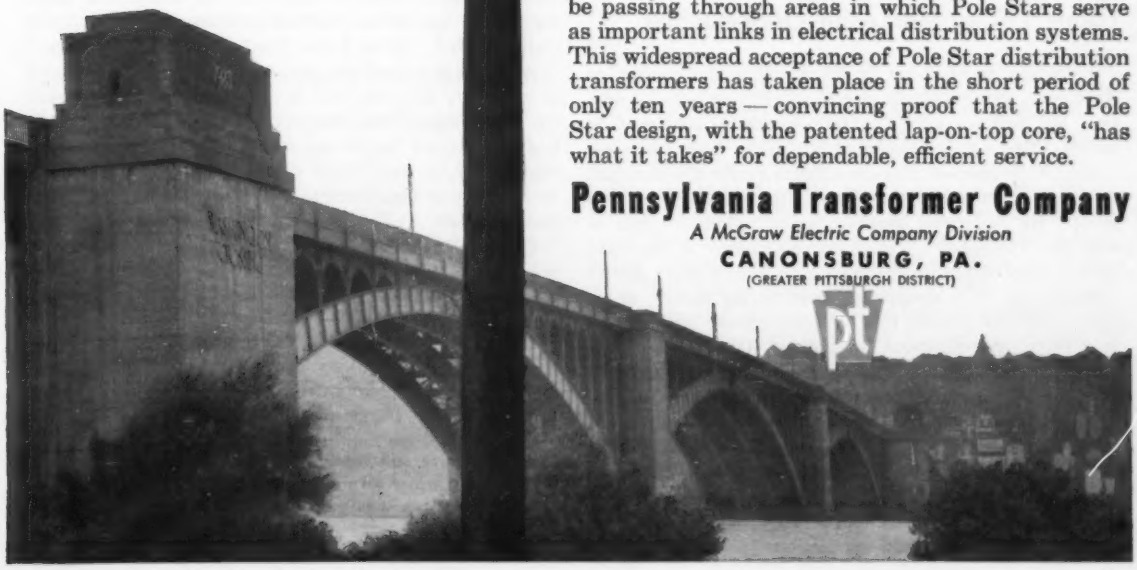
In fact, just about anywhere in the country that Washington might travel — and in this day and age he probably would explore most of it — he would be passing through areas in which Pole Stars serve as important links in electrical distribution systems. This widespread acceptance of Pole Star distribution transformers has taken place in the short period of only ten years — convincing proof that the Pole Star design, with the patented lap-on-top core, "has what it takes" for dependable, efficient service.

Pennsylvania Transformer Company

A McGraw Electric Company Division

CANONSBURG, PA.

(GREATER PITTSBURGH DISTRICT)



GEORGE A. HUGHES AWARDS: Range promotion—R. W. Smith, left, Metropolitan Edison and E. H. Gardiner, Texas P&L; commercial cooking—Ralph Layfield, Georgia Power; water heating—C. W. Ailstock, Florida Power; commercial cooking—R. W. Wilson, Kentucky Utilities; water heating— R. W. Otterholm, Ohio Power; Arthur Bell, Hotpoint Co, donor

EEI's 1955 Award Winners . . .

Here are the utilities and people who walked away with the prizes for best sales promotion entries during the past year . . . eight awards to 24 winners

LAURA McCALL AWARDS for home service work: Ruth New, left, Cincinnati G&E; Katherine Shank, Dayton P&L; Phyllis Davis, Atlantic City Electric, Vivian Marshall, New Orleans PS; Evelyn Brockett and Mary Liles, Cleveland Electric Illuminating; Elizabeth Sweeney Herbert, McCall's magazine, donor

FARM SALES: Higher Food Demands, Fewer Farmers Bring Marketing Opportunities

Electricity must move in when the tenant farmer or hired hand moves out. In face of a declining farm population, the nation's need for farm products continues to mount. That's the situation facing utility farm salesmen.

Carl T. Bremicker, Northern States Power Co, sketched in this background in the opening talk before the Farm group. He and other speakers urged utilities to join in with the "Housepower" program and carry it to the farm areas. They urged selling keyed to future farm needs.

Reporting on a seven-state farm wiring survey, J. C. Cahill, Detroit Edison Co, said inadequate farm wiring is a block to equipment promotion. Trouble is, Cahill continued, farmers don't recognize this. Eight out of ten of the farmers queried were satisfied with present wiring installations; yet most of them said they had considered improving their wiring at one time or another. The survey indicated that farm organizations and farm magazines are the best ways to get the wiring story across.

In this connection Bremicker suggested that utilities provide a "farm layout service" to provide adequate wiring installation for present and future needs. To spur farm equipment sales, he suggested that utility farm salesmen study the recent bulletin published by Iowa State College titled, "How Farm People Accept New Ideas."

A locally produced film showing many farm applications of electricity is a sales tool in a Washington Water Power Co kit. General Sales Supervisor G. F. DeFoe said it had been shown before numerous farm groups and over three radio stations in the company's service area. It is more effective than other types of promotion in helping find prospects, DeFoe reported.

Competitive aspect of farm power sales was stressed by W. J. Ridout, Jr, editorial director of Electricity on the Farm magazine. He called for an all-out attack on

Farm Sales Tips

- **Tell wiring story through farm organizations and farm magazines.**
- **Recognize and combat L-P gas competition**
- **Study farmer attitudes. Recent Iowa State College bulletin,' 'How Farm People Accept New Ideas" is worthwhile**

THOMAS W. MARTIN Rural Electrification Award: E. A. Wilson, Alabama Power, right, presents plaque to Dwight Garber, Dayton P&L. Awards Committee Chairman G. W. Ousler is at left

BETTER LIGHT BETTER SIGHT Awards for lighting education: D. E. Boots, Dayton P&L; H. A. Lawrence, CEI; H. A. Stroud, chairman BLBS Bureau, donor

FRANK WATTS AWARDS for rural promotion: Ralph Bowen, Wisconsin EP; Lyman Hammond, New York State E&G; M. B. Penn, Alabama Power; and Elliott Odell, Farm Journal magazine, donor

LIGHTING PROMOTION AWARDS: E. D. Kenna, Jr., Mississippi P&L; R. W. Wyman, CEI; presented by C. A. Burton, Sylvania Electric Products; H. E. Plishker, Westinghouse and J. C. Forbes, GE

GEORGE WESTINGHOUSE AWARDS for automatic laundry promotion: O. R. Williamson, Kentucky Utilities; R. W. Smith, Metropolitan Edison; Betty Furness and Jack Lee of Westinghouse

MORE POWER TO AMERICA Award for industrial electrification: Frank Smith, Jr., Mississippi P&L; R. W. Wyman, CEI; Karl Runkle, General Electric, donor

liquid petroleum gas and other competing energy sources. "Let's get off the treadmill and establish a hard hitting, effective program that is industry wide," he said.

RESIDENTIAL SALES: "Electrical Allies Are a Utility's Best Friends" — Woo Them

Singing "Allies are a guy's best friend" to the famous tune about a girl and her diamonds, EEI's Residential Committee rolled off a program to show just that.

R. L. Coe, Residential Promotion Committee chairman, came up with some testimonies as to the effectiveness of EEI's coordinated campaigns—each one personally delivered by an electrical distributor who had used them:

• Joseph McCaffery, South Bend, Ind., told how he jumped his water heater sales volume 55% through a cooperative promotion with his dealers and Indiana & Michigan Electric Co. He also credited I&M's 1¢ water heater rate and its time purchase plan for building public acceptance.

• Through continuous promotion in which he matched Niagara-Mohawk Power Corp "ad for ad," Buffalo Distributor R. P. Gubbins increased dryer sales 85% and better in each of two months. "We listed our dealers in our ads, and sent our own salesmen out to encourage them to use the EEI materials," explained Gubbins. "It paid off."

• By plugging low cost ranges and offering free installation on deluxe models, W. B. Frogue's distributorship in St. Louis upped range sales 19% in a "Treasure Hunt" promotion conducted with Union Electric. "Utility help," said Frogue, "we love it."

Seen as another utility ally is the local department store, particularly in the sale of lighting. General Electric's Lamp Division presented a fashion show which ties together women's apparel, home decorations and portable lamps into one package. GE plans to offer the show to utilities for staging with stores in their own cities. It will be part of a new GE "Light for Living" program to be announced in June.

Residential Sales Tips

- **Tie-in with EEI's coordinated campaigns**
- **Put fashion appeal into your lighting promotions**
- **Work closer with trade allies. It pays off**

Radio Interference

. . . with utility operations may be caused by increased crowding, Utilities Radio Unit notes

Increased crowding in the power radio service may cause interference with power utility radio operations, the executive council of the National Committee for Utilities Radio noted at its recent Washington meeting.

The council met to discuss the status of Federal Communication Commission dockets pertaining to the use of radio by electric, gas, water, and steam utilities and to set up agenda for the NCUR annual meeting to be held at Omaha, Neb., beginning today, April 23, and ending Wednesday, April 25.

Split-Channel Plan Proposed

The need for additional usable frequencies in the power radio and other services may call for a carefully engineered split-channel plan, the council noted. It also pointed out the advisability of a general review of frequency allocation, including frequencies reserved for government use.

At the meeting, objections were proposed to the close frequency tolerance and 5-kc limitation on deviation for modulation specified in FCC Docket 111253 (split-channel). These restrictions were held to be impractical in the present state of the art and unnecessary for obtaining satisfactory operation with the proposed channel separations. Establishment of channels with 15-kc separation, but assignment in any one area on alternate channels, was proposed for the 152 to 162-mc band.

The council approved a petition to FCC requesting changes in the rules for the power radio service permitting use of tone signals or impulses, for control purposes, transmitted from attended base or mobile stations to associated receivers in that service. The petition proposed that the duration of such tone signals in any one transmission be as short as practicable, not exceeding 15 sec.

A council resolution directed the NCUR representative on the Micro-Wave Council to explain to chairmen of regional associations represented by NCUR the procedure by which applicants for micro-wave station licenses can obtain assistance of the Micro-Wave Council.

Changes in Capacity Reported to FPC

PLANT ADDITIONS DURING FEBRUARY

State	Utility	Plant	Fuel	Capacity
Me.	Central Maine Power Co	Bar Mills	H	4,000
Mass.	Hudson Light & Power Dept	Hudson	IC	4,000
N. J.	Vineland Electric Dept	Vineland	S	10,000
Pa.	Duquesne Light Co	F. Phillips	S	125,000
Ohio	Dover Municipal Electric Light Dept	Dover	S	7,500
Mich.	Detroit Edison Co	River Rouge	S	260,000
Iowa	McGregor Municipal Light Plant	McGregor	IC	545
Iowa	Strawberry Point Municipal Electric Light Plant	Strawberry Point	IC	488
Iowa	Stuart Municipal Utilities	Stuart	IC	675
Md.	Baltimore Gas & Electric Co	H. A. Wagner	S	125,000
Ga.	Georgia Power Co	Goat Rock	H	5,000
Ky.	Louisville Gas & Electric Co	Cane Run	S	100,000
Tenn.	Tennessee Valley Authority	John Sevier	S	180,000
Tex.	Dallas Power & Light Co	Mountain Creek	S	108,696
Tex.	Southwestern Gas & Electric Co	Knox Lee	S	75,000
Wash.	Bureau of Reclamation	Chandler	H	6,000
Wash.	Centralia Municipal Light Dept	Centralia	H	5,000

RETIREMENTS

Me.	Bangor Hydro-Electric Co	Milford	H	3,000
Mass.	Hudson Light & Power Dept	Hudson	IC	615
Ohio	Dover Municipal Electric Light Dept	Dover	S	160
Ill.	Commonwealth Edison Co	Fisk	S	36,000
Mo.	Segelhorst Brothers	Bourboise	H	48
S. D.	Rosebud Electric Association, Inc	Winner	IC	1,400
Ky.	Kentucky Utilities Co	Paducah 2	S	12,500
Calif.	California Oregon Power Co	Happy Camp	IC	100

U. S.	Hydro	Steam	IC	Total
Added	20,000	991,196	5,708	1,016,904
Retired	3,048	48,660	2,249	53,957
Adjustments Plus	0	82,000	0	82,000
Adjustments Minus	0	2,000	0	2,000
Net Change	16,952	1,022,536	3,459	1,042,947

H—Hydro, IC—Internal Combustion, S—Steam
United States Capacity as of March 1—Hydro, 25,154,711 kw; Steam, 88,079,434 kw; IC, 2,357,249 kw; Total, 115,591,394 kw.

Sandy Rejects Co-op Bid, PGE Vote Set

Members of Sandy, Ore., Electric Cooperative recently voted down a recommendation by its board of directors to sell its struggling system east of Portland to another co-op. The prospective buyer, Consumers Power, Inc, of Corvallis, was rejected 444 to 209.

Another vote to decide on a slightly lower offer made by Portland General Electric Co probably will be held sometime between today, April 23, and May 5, Sandy Manager Charles M. Emslie reports. Acceptance requires, by Oregon law, an affirmative vote of two-thirds, or 599 of the 898 members. The investor-owned company's rates on neighboring lines are about half those of the ailing co-op.

The Sandy co-op, loaded with nearly $1 million of Rural Electric Administration capital debt, had voted earlier to open negotiations for sale of its system (EW, Feb. 13, p 48). The decision brought a "willing but not anxious" offer of $1,007,300 from PGE. Consumers Power upped the ante $2,700 and won endorsement by Sandy's board.

PGE Board Chairman Thomas W. Delzell said he had not analyzed Consumer's offer. But he added that his company's rate department had reported Corvallis co-op's rates were higher than PGE's.

Consumer Power's Manager B. R. Little had assured Sandy's members, however, that "a substantial reduction in retail power rates" could be made and the system operated profitably.

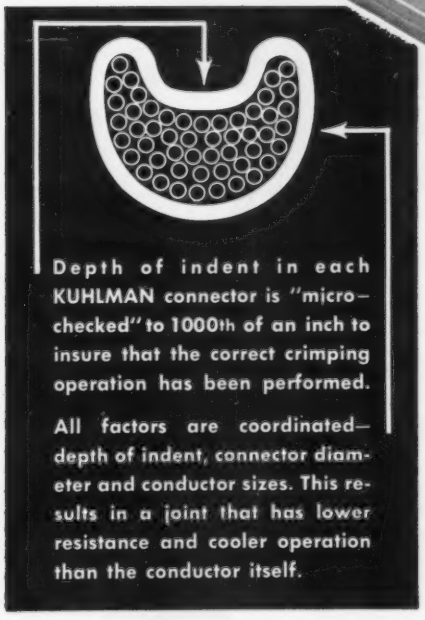
Rindge, N. H., System Sold

Public Service Co of New Hampshire recently purchased the Rindge, N. H., Electric Light Dept facilities for $100,000. The 40-year-old municipal distribution system had 657 meters as of January 1955.

The Big News for '56

85% Pull-Out Strength

KUHLMAN eliminates service interruptions due to faulty transformer connections.



Depth of indent in each KUHLMAN connector is "micro-checked" to 1000th of an inch to insure that the correct crimping operation has been performed.

All factors are coordinated—depth of indent, connector diameter and conductor sizes. This results in a joint that has lower resistance and cooler operation than the conductor itself.

For your plus protection, the depth of indent on every single KUHLMAN transformer terminal connection is "micro-checked" to 1000th of an inch.

With a minimum pull-out strength of 85%—just short of the mechanical strength of the conductor—plus a conductivity greater than 100%, KUHLMAN connections actually operate cooler than the conductor. These KUHLMAN connections will outlive the long life of the transformer itself.

In the KUHLMAN laboratories, advanced studies on coordinating wire, terminal sizes and depths of indent are resulting in new standards of transformer dependability and long life. Your KUHLMAN representative will be happy to explain the engineering that has won approval for KUHLMAN transformers in hundreds of America's outstanding utility companies.

KUHLMAN
ELECTRIC COMPANY

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

ENGINEERS interested in transformer design and related work are invited to investigate opportunities at Kuhlman. Contact: Personnel Manager, Bay City, Michigan.

Here's an outstanding new development for RESIDENTIAL AREA LIGHTING

L-M's New Open Type Luminaire For Small Mercury or Incandescent Lamps

This completely new development in luminaires offers these advantages:

1. Pleasing appearance for residential areas.

2. Specially designed for the new 100 watt (3300 lumen) and 175 watt (6800 lumen) mercury vapor lamps.

3. Also efficiently handles incandescent lamps up through 6000 lumens.

4. Holophane® refractor glassware will provide type II 4-way offset, standard type II, type I, and type III patterns.

5. Open glassware provides for excellent cooling, larger lamps, easy re-lamping.

6. Alzak aluminum reflector, latched for direct attachment to Standard NEMA head.

7. L-M's V-band attachment provides easy replacement of glassware.

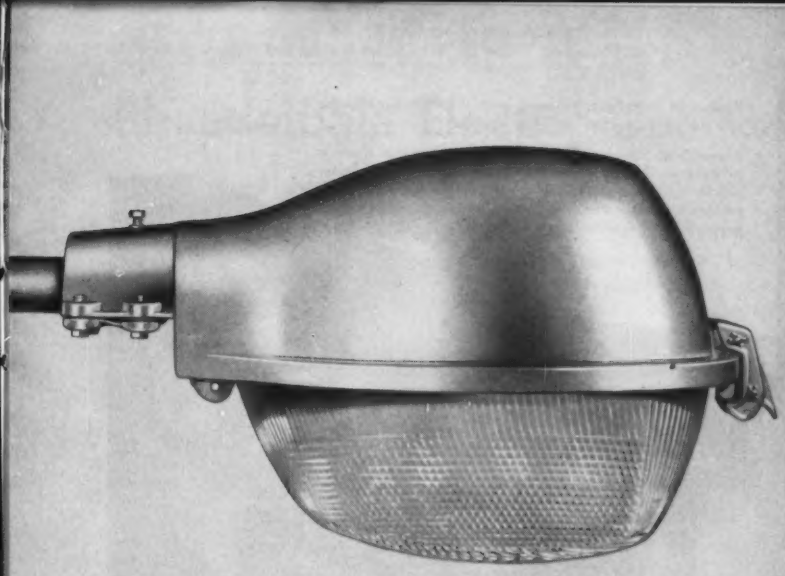
8. Modestly priced, but because of its design the luminaire handles much larger lamps than other luminaires at this price.

Ask the L-M Field Engineer for information on features, design, and delivery of the several types. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

233

LINE MATERIAL

Street Lighting



L-M's new mercury vapor Ovalite has high co-efficient of utilization on the street side, with a choice of types III or IV asymmetric light distribution merely by changing glassware.

Lamp and socket swing down, become automatically de-energized for quick, Service-Safe re-lamping during circuit operation.

Wiping-action contacts open circuit on multiple unit . . .

Now Quick Re-Lamping Possible with Ovalite's Automatic De-Energizing Feature

New Service-Safe design automatically isolates lamp and socket from circuit. As luminaire is closed, circuit is completed by means of wiping-action silver-plated beryllium copper contacts.

By **STACY STANDLEY**
Manager of Lighting Sales
Line Material Company

Here's a new feature in luminaire design that offers savings in servicing. L-M's Ovalite lamp and socket are automatically de-energized and isolated to provide quick, safe re-lamping of the luminaire during circuit operation.

The lamp and socket are part of the refractor assembly. On this multiple unit, wiping-action contacts open as the assembly is swung down, isolating the lamp and socket from the circuit and providing easy, safe access to the luminaire. The wiping action keeps the contacts clean.

The Service-Safe feature is also available on L-M's series Ovalite. This series Ovalite has a shunting make-before-break action.

Other Outstanding Features of L-M's Ovalite

Choice of type III or IV light-distribution pattern by simply changing the glassware.

High co-efficient of utilization on street side.

Latch automatically assures positive closing of luminaire when refractor is pushed up.

Both latch and hinge have a spring action to hold the refractor firmly against the gasket, assuring a bugproof, dustproof, and weatherproof seal.

Complete refractor assembly can be removed easily when desired, cannot be accidentally unhooked.

Hood is a smoothly finished one-piece aluminum casting.

One-piece aluminum reflector.

All hardware is stainless steel or non-ferrous metal.

No trapped light at the glassware junction.

Reflector and refractor are easily cleaned.

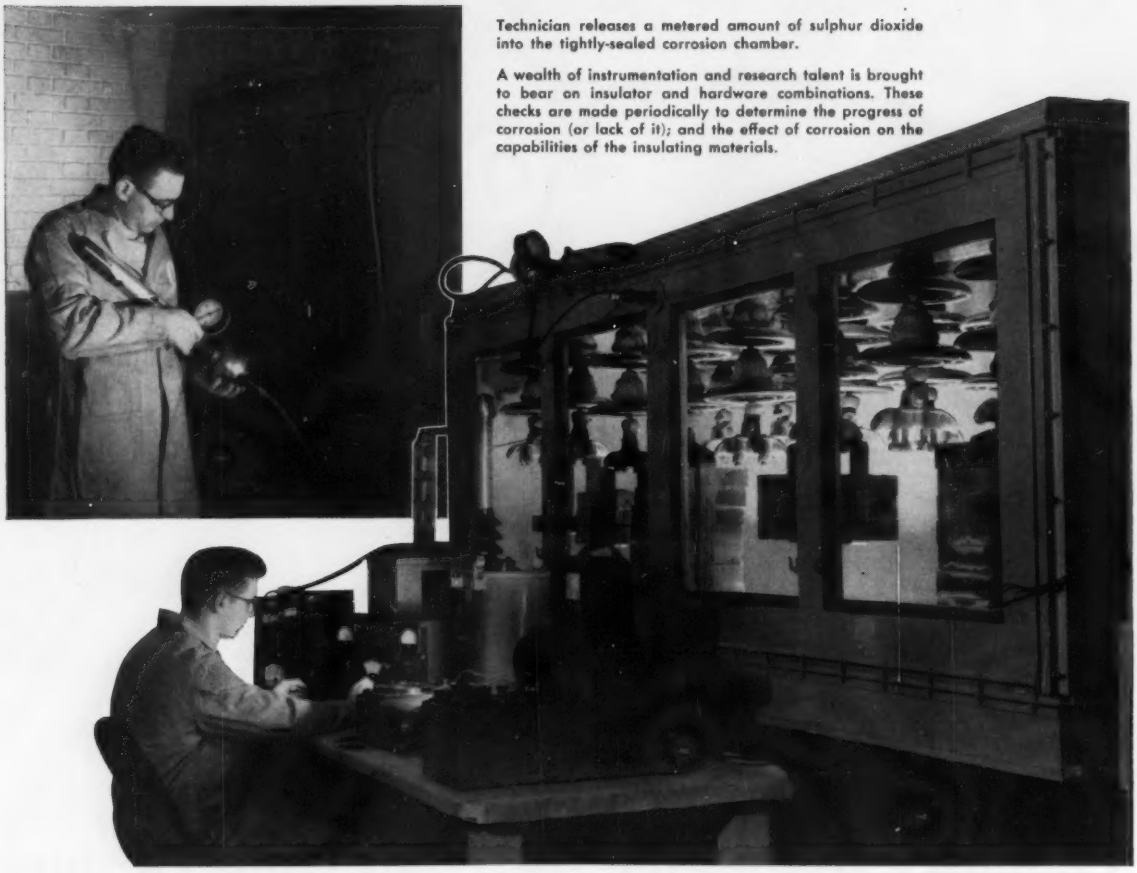
Get Complete Information

Ask the L-M Field Engineer or Lighting Engineer for information on the new L-M Ovalite, and on L-M's Lighting Recommendation Service. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division.)

"Ovalite" and "Service-Safe" are Line Material Company trademarks.

212

LINE MATERIAL *Street Lighting*



Technician releases a metered amount of sulphur dioxide into the tightly-sealed corrosion chamber.

A wealth of instrumentation and research talent is brought to bear on insulator and hardware combinations. These checks are made periodically to determine the progress of corrosion (or lack of it); and the effect of corrosion on the capabilities of the insulating materials.

We make our own weather

To Check Insulator Performance In Corrosive Atmosphere

Left in natural atmosphere, hardware usually doesn't corrode fast enough for practical study. So O-B engineers make their own "weather" inside this chamber.

Our man-made weather—or atmosphere—is a rich blend of sulphur dioxide, humidity, and heat. In it, corrosion takes place at a much faster rate than it would in even the worst regions of natural contamination.

Accelerated corrosion promises to give us many answers on insulator and hardware performance, without waiting on nature—answers we hope will bring benefits to users of O-B insulating materials. Note that we're studying both hardware *and* insulator performance. O-B makes both. You're concerned with their joint performance. So we study how they perform together.

Also important is the state of mind that makes such research possible. Without any assurance of commercial benefit, O-B pursues this work, spending considerable money and using the time and energy of a group of talented technical people.

The willingness to undertake such research is part of the TC idea—and Technical Competence *is* the heart of every Ohio Brass Product!

OHIO BRASS COMPANY • MANSFIELD, OHIO

4667-H

TECHNICAL COMPETENCE

The Heart of Every Ohio Brass *Insulator*

Philadelphia Electric Ups Gaty

Philadelphia Electric Co's new vice president of research and development is Lewis R. Gaty, engineering department manager since 1948. He will be responsible for research related to supply of electricity, gas, and steam service, and for development of new methods, materials, and devices in these fields.

An electrical engineering graduate of Cornell University, Gaty joined Philadelphia Electric as junior engineer. He later progressed to electric superintendent, gas superintendent, overhead lines superintendent, assistant to the general superintendent of transmission and distribution, and assistant electric engineer. He was named electric engineer in 1945.

LEWIS R. GATY

Stauffer to Head NEGEA Unit

Ralph D. Stauffer has been elected president of the NEGEA Service Corp, subsidiary organization of New England Gas & Electric Association, Cambridge, Mass. The corporation headed by Stauffer is one of seven subsidiaries of the parent association, six of which are operating utilities serving Cambridge, New Bedford, Plymouth, Cape Cod, Martha's Vineyard, and Worcester (Gas).

A mechanical engineering graduate of Pennsylvania State University, Stauffer has been in public utility work for about 30 years. Prior to his recent appointment he was vice president, chief engineer, and director of electric operations for the Service Corp.

RALPH D. STAUFFER

Bartley Appointed Controller

The promotion of J. H. Bartley from assistant controller to controller has been announced by Iowa-Illinois Gas & Electric Co. He replaces C. P. Van Dyke who retired April 1.

A veteran of 32 years with Iowa-Illinois G&E, Bartley started as an addressograph clerk in the company's Rock Island office. Since that time he has served in various capacities, including bookkeeper, assistant cashier, credit manager, supervisor of the utility's Business Machines Division, local manager at Rock Island, and district manager in Ottumwa.

J. H. BARTLEY

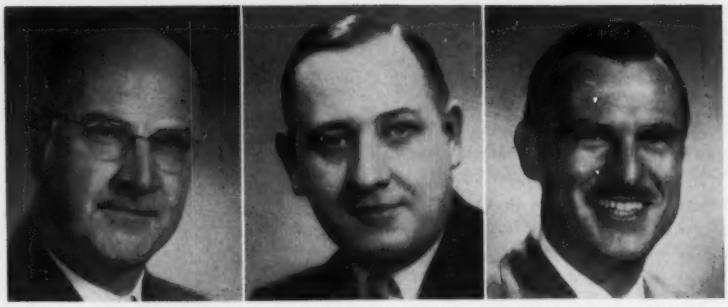
Ohio Edison Co Advances Nelson

Erik N. Nelson, production maintenance manager for Ohio Edison Co, has been named general superintendent of system operations to succeed Alfred L. Richmond, retiring April 30 after 42 years with Ohio Edison and predecessors.

Before assuming his most recent post, Nelson served Ohio Public Service Co as results engineer, production engineer, distribution department engineer, distribution superintendent, and system production engineer.

Moving into the new post of general system planning engineer is Elmer A. Rothfus of the engineering staff of Commonwealth Associates, Inc, where for the past 10 years he was closely identified with numerous Ohio Edison projects.

ERIK N. NELSON



W. C. MAINWARING JOHN C. INGRAM DR. OTTO ZWANZIG

B. C. Utilities Appoint 3 Executives

Key appointments have been made by Western Development & Power, Ltd, and by British Columbia Electric Co, both subsidiaries of B. C. Power Corp, Ltd.

W. C. Mainwaring, vice president and assistant to the president of B. C. Electric, has been elected president of Western Development, an organization formed in January to settle new industry in British Columbia based on hydro-electric power and other natural resources. In his 45-year career in the Canadian utility industry he has been successively district sales manager for Northern Electric Co in B. C., merchandising manager for B. C. Electric, general sales manager, and for the past 12 years, a vice president of the firm.

John C. Ingram, who for the past 10 years has been Ontario supervisor of the Industrial Development Bank, joins Western Development & Power on May 1 as director of industrial development.

New general sales manager for B. C. Electric Co is Dr. Otto Zwanzig, utilities consultant formerly with American Gas Association of New York. He succeeds Howard N. Walters who is retiring.

PERSONAL BRIEFS

Robert J. Rhinehart, division superintendent for Arkansas Power & Light Co, has been elected president of the National Society of Professional Engineers to succeed **Allison C. Neff.**

New manager for Central Illinois Light Co's Springfield Division is **C. O. Roese.** Present manager **T. C. Coe** transfers to the firm's general offices at Peoria.

Recently elected chairman of the Connecticut Farm Electrification Council is **W. B. Young,** dean of University of Connecticut's College of Agriculture. **Samuel Ferguson, Jr,** vice president of Connecticut Power Co, was elected vice chairman, and **Walter T. Ackerman,** Connecticut Light & Power Co's farm service director, was re-elected secretary-treasurer.

Walter B. Morton has resigned as chairman of Pennsylvania Electric Association's Electrical Equipment Committee because of additional duties at Pennsylvania Power & Light Co. Vice chairman **E. M. Gue** has been appointed chairman to fill the unexpired term.

Appointed to the newly created post of manager of the Rural Electrification department of Southwestern Public Service Co is **H. R. Worthington** of the company's electric distribution department.

William J. Campbell, formerly assistant general manager for Fraser-Brace Engineering Co of New York and consulting engineer for Alabama Power Co, has joined the utility's engineering department to work on its proposed Coosa-Warrior projects.

Pacific Power & Light Co has promoted **E. G. Richards** from Walla Walla district manager to Albany, Ore., district office manager. His successor is **Keene Atwood,** Dallas, Ore., district office manager, and **William Scholtes** replaces Atwood.

Rochester Gas & Electric Co has named **Francis E. Drake** manager of the rate and economic research department, with **Foster B. Burnett** as assistant manager.

Atomic Energy Commission has appointed **Dr. Clifford Keith Beck** to the commission's staff to assume administrative and technical responsibility in its reactor safety program . . . **Bryan F. LaPlante** succeeds **William C. Wampler** as special assistant to AEC General Manager **K. E. Fields.**

Westinghouse Electric Corp Vice Pres **Frank L. Snyder** has been appointed to the staff of **A. C. Monteith,** vice president of Apparatus Products Divisions, to aid in direction of the company's nation-wide apparatus products organization. Succeeding Snyder as Transformer Division manager is **John H. Chiles, Jr,** divisional engineering manager since 1949. He is replaced by **M. E. Fagan, Jr,** formerly ordnance department manager. Retirement of industrial relations manager **C. D. Moore** has resulted in the appointment of **Charles H. Chance** to that position.

John J. Halvorsen, formerly technical director of plastic pipe and fittings for Continental Can Co, has joined Orangeburg Manufacturing Co, Inc, as manager of sales and development of the company's new plastic pipe division.

Norwood D. Kenney has been designated assistant chief engineer of Simplex Wire & Cable Co and **Henry R. Stoddard** becomes head of the cable applications section. **Walter K. Freeman** is scheduled to become product development engineer.

OBITUARY

Ollison Craig, 68, vice president of Riley Stoker Corp since 1949, died recently at Ft. Lauderdale, Fla., where he was vacationing.

Philip H. Harris, 75, president of Pennsylvania Electric Co from 1937 to 1946, died recently.

George Bowen Thomas, 75, retired Utah Power & Light Co official, died recently in Salt Lake City. He was former secretary, treasurer, vice president, and director of the company.

Racks are designed for a minimum space requirement and can be passed through a 30"-diameter manhole.

Submersible equipments...

L-M's New Secondary Network Capacitors Increase Capacity, Improve Voltage

Line Material's new 216 volt, 13⅓ kvar submersible capacitor equipments can be your answer to heavier network loading. Secondary capacitors will improve the low power factor of heavy motor loads, such as air conditioning. This substantially reduces loading on conductors and transformers, and helps to improve low voltage conditions. Capacitor units can be installed more quickly and at much less cost than system changes, such as larger transformers, cables and additional vaults.

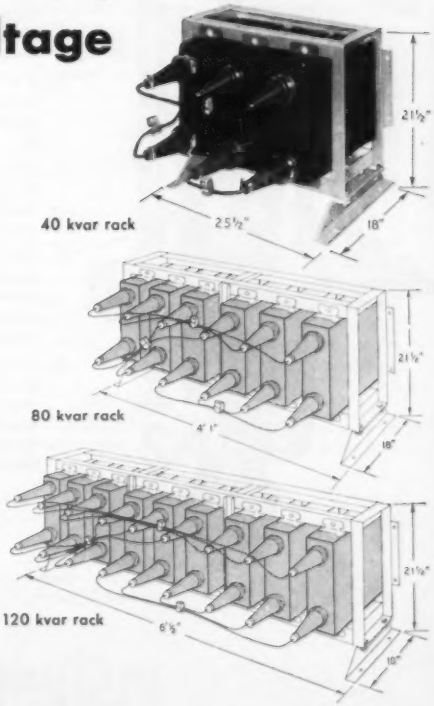
L-M's new secondary capacitors have outstanding product features such as aluminum metallic coating under a primer and finish coat of alkyd resin paint, strong solder-sealed bushings, and low-temperature Elemex liquid dielectric. Each unit is equipped with one terminal mounted current limiting fuse; bushings are enclosed in water-tight covers.

Capacitor Racks

Capacitor units are available in 40, 80, and 120 kvar racks, entirely assembled at the factory and ready for installation in the field. Racks can be stacked or mounted on floor, wall, or ceiling in many arrangements to fit vault space. Ambient temperature limits are 55° C. for single-tier equipments and 40° C. for two- or three-tier equipments.

Get Complete Information

Ask the L-M Field Engineer for information on features, design, and delivery on L-M's new secondary network capacitors and capacitor equipments. Or write Line Material Company, Milwaukee 1, Wisconsin

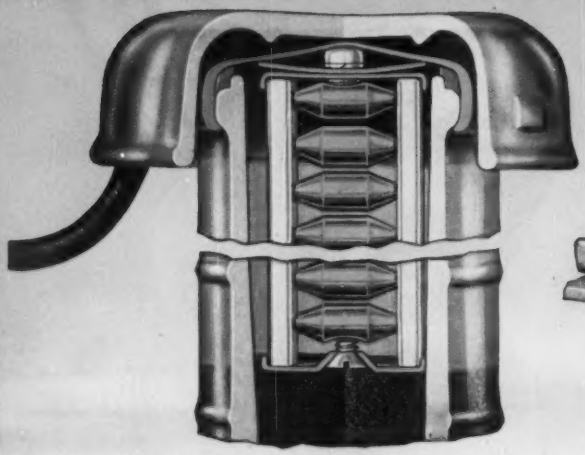


LINE MATERIAL

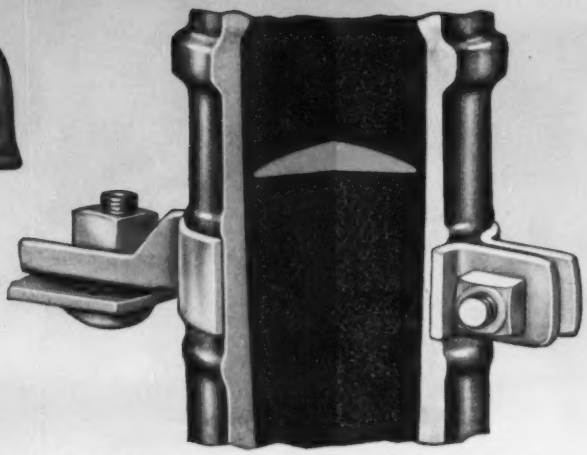
A McGRAW ELECTRIC COMPANY DIVISION

247

Elemex® Capacitors

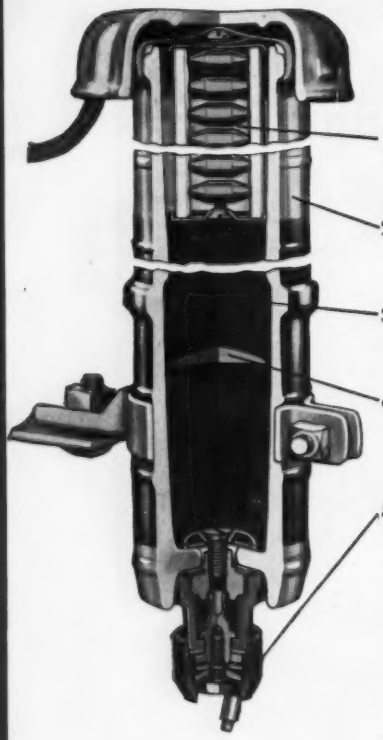


Pre-set and permanently sealed gaps on the valve arrester cannot get out of adjustment. The exposed external gap on most expulsion arresters can be knocked or burned out of adjustment, thereby changing both 60-cycle and surge sparkover characteristics.



The valve element is electrically and mechanically unaffected in handling lightning discharges usually encountered in service. The non-linear resistance of the valve element reduces the 60-cycle follow current to a value which the gaps can extinguish. The expulsion arrester ages and changes its characteristics because internal fibre parts erode during operation.

Valve Arresters Have Longer



Features of L-M's Valve Arrester

1. The ladder spark gap is designed to provide a perfect balance between 60-cycle sparkover and impulse sparkover.
2. The Pyrex glass housing permits visual inspection to detect mechanical or electrical damage.
3. "Granulon," the valve material, is able to withstand severe heating which accompanies heavy strokes of lightning.
4. Lens-shaped electrodes in the element compensate for "skin effect," assuring uniform distribution of surge current throughout the valve element.
5. L-M's exclusive "Isolator" gives positive assurance against grounding feeders by instantly disconnecting the ground lead from the arrester if the arrester should ever become damaged.

FOUR PRINCIPAL REASONS

for recommending valve over expulsion type arresters

1. Better Protective Characteristics—The valve arrester sparks over more quickly and at lower voltages on lightning surges. Transformer end turns are not stressed by a complete voltage collapse following sparkover. Although the expulsion arrester provides a satisfactory level of protection for most transformers, a higher degree of protection is available through the proper application of valve arresters.

2. Unlimited 60-Cycle Capacity—The application of the valve arrester is not limited by the available short-circuit current. The expulsion arrester, operating on a pressure principle, has a definite top limit and may have a bottom short-circuit current rating. (Too much current causes it to explode; too little fails to expel the arc.)

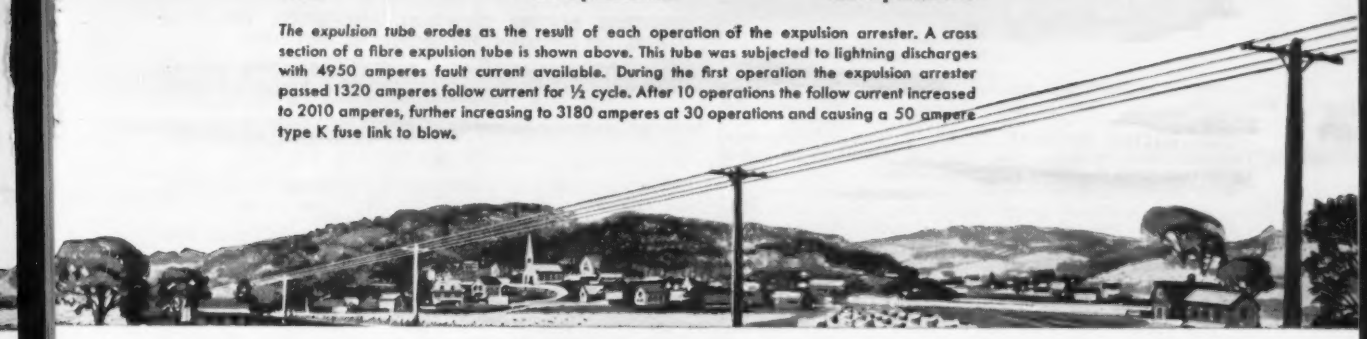
3. No Fuse Coordination Problems—The valve arrester will pass relatively small values of 60-cycle follow current, regardless of system capacity. Expulsion arresters can pass high follow current which may cause unnecessary operations of sectionalizing devices.

4. Longer Life—The valve arrester is electrically and mechanically unaffected in handling lightning discharges usually encountered in service. Its life is relatively unlimited. The expulsion arrester ages and changes its characteristics because atmospheric conditions and erosion due to operation affect the fibre.

LM® LINE

New | 10 Operations | 30 Operations

The expulsion tube erodes as the result of each operation of the expulsion arrester. A cross section of a fibre expulsion tube is shown above. This tube was subjected to lightning discharges with 4950 amperes fault current available. During the first operation the expulsion arrester passed 1320 amperes follow current for ½ cycle. After 10 operations the follow current increased to 2010 amperes, further increasing to 3180 amperes at 30 operations and causing a 50 ampere type K fuse link to blow.



Life Than Expulsion Arresters

Here's Why:

by HERMAN O. STOELTING
Special Assignments Engineer
Line Material Company

Expulsion arresters change their operating characteristics as the fibre of the arrester is eroded. Conversely, valve arrester characteristics do not change for all discharges of the magnitude usually occurring in service. For these and other reasons, valve arresters are better than expulsion arresters. Compare the basic differences in construction and operation, described below, and we believe you will see why more and more companies have adopted valve type arresters as standard, and why, although we make *both* types, we at L-M say that *valve arresters are better than expulsion arresters.*

Construction and Operation of Expulsion Arresters

The expulsion arrester, operating on the pressure principle, extinguishes follow current in much the same manner as fuse cutouts. Fibre is generally used to generate the gases which expel the arc. Each time the arrester operates, fibre is eroded. The pictures above show the result.

Erosion of the fibre occurs with each operation until, eventually, insufficient pressure is generated to extinguish the arc. Operation of a sectionalizing device is then required to clear the fault. Erosion to the point where the arrester will no longer interrupt follow current may occur with relatively few operations on circuits where the follow current is high. With only a few high amperage shots, this can happen very early in the life of the arrester.

Upper and Lower Limits

In addition to the above disadvantages, expulsion arresters have upper and possibly lower limits for the magnitude of fault currents on the systems to which the arresters may be properly applied. If the arrester is subjected to a high 60-cycle follow current, it may explode. If the 60-cycle follow current is too low, the expulsion arrester may fail to extinguish the arc.

The exposed external gap on most expulsion arresters is another source of trouble. It is not bird- or insect-proof. Further, the gap can be knocked or burned out of adjustment, thereby changing both 60-cycle and surge sparkover characteristics.

Trouble for Trouble-Men

The expulsion arrester failure problem is further complicated because the lineman cannot tell by inspection in the field if the arrester is failing to clear the arc. Trouble-men may spend hours and drive miles looking for a burndown or an equipment failure . . . and find nothing.

Construction and Operation of Valve Arresters

The valve arrester operates on the principle of a valve. It "opens" with low resistance to high-voltage, high-current lightning surges, and "closes" by offering high resistance to power follow current.

The valve arrester is chemically inert. It is electrically and mechanically unaffected by lightning discharges usually encountered in service. The valve material limits the 60-cycle follow current to a value which the gap can extinguish, with no change in characteristics. This is true regardless of the magnitude of follow current available. The valve arrester gaps are pre-set and permanently sealed; they cannot get out of adjustment.

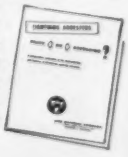
In rare cases, valve arresters will fail when subjected to high 60-cycle overvoltage or excessive surge currents. Line Material valve arresters provide insurance against line lockout with L-M's exclusive "Isolator," which instantly disconnects the ground lead from the arrester.

Many Companies Changing Over

Moisture troubles in early valve arresters, which at one time caused some utilities to change to expulsion arresters, were eliminated years ago. Many of these companies have now changed back to valve arresters. If you are still using expulsion arresters, you will now find ample justification for switching back to the valve type.

Get Complete Information

Details of some of the extensive evidence in favor of valve over expulsion arresters are given in a new booklet, "Valve versus Expulsion Arresters." Whichever type you use, we believe you'll be interested in this report. Ask your L-M Field Engineer for a copy or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



MATERIAL Lightning Arresters

MEETINGS CALENDAR

APRIL

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Technical Conference, Bradford Hotel, Boston, Mass., April 26-27.

GERMAN INDUSTRIES FAIR—Hanover, Germany, April 29.

ROCKY MOUNTAIN ELECTRICAL LEAGUE—Spring Meeting, Shirley-Savoy Hotel, Denver, Colo., April 29-May 1.

EDISON ELECTRIC INSTITUTE—Engineering Committees, (Electric Equipment & Metering Service, Prime Movers, Transmission & Distribution, and Hydraulic) Edgewater Beach Hotel, Chicago, April 30-May 2.

MAY

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—North Eastern District Meeting, Sheraton Hotel, Rochester, New York, May 2-4.

EDISON ELECTRIC INSTITUTE—Accident Prevention Committee, Coronado Hotel, St. Louis, Mo., May 2-4; Purchasing & Stores Committee, Sheraton Plaza Hotel, Boston, Mass., May 7-9; Commercial Electric Cooking Conference, Sheraton Hotel, Chicago, Ill., May 8; Transportation Committee Meeting, jointly with AGA, Congress Hotel, Chicago, Ill., May 8-11; Industrial Relations Committee, Willis E. Hughes Memorial, Rochester, N. Y., May 17; Orientation Meeting, jointly with AGA, Headquarters, New York, N. Y., May 21.

NATIONAL FARM WIRING CONFERENCE—LaSalle Hotel, Chicago, Ill., May 3-4.

***PENNSYLVANIA ELECTRIC ASSOCIATION**—Hydraulic Power Committee, Hotel Warwick, Philadelphia, Pa., May 3-4; System Planning Committee, Hotel Alexander, Hagerstown, Md., May 7-8; Transmission and Distribution Committee, Skytop Lodge, Skytop, Pa., May 10-11; Communications Committee, Nittany Lion Inn, State College, Pa., May 14-15; Relay and Electrical Equipment Committees, Hotel Roosevelt, Pittsburgh, May 17-18; Annual Accounting Conference, Warwick Hotel, Philadelphia, Pa., May 21-22; Systems Operations Committee, Bedford Springs Hotel, Bedford, Pa., May 24-25.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS—Executive Committee, Leamington Hotel, Minneapolis, Minn., May 4.

ATOMIC INDUSTRIAL FORUM, INC—Hotel Plaza, San Antonio, Texas, May 10-11.

NORTHWEST PUBLIC POWER ASSOCIATION, INC—Engineering & Operations Section, Cascadian Hotel, Wenatchee, Washington, May 10-11.

PUBLIC UTILITIES ADVERTISING ASSOCIATION—Annual Convention, Philadelphia, Pa., May 10-11.

INTERSTATE POWER CLUB—Hotel Martinique, N. Y. C., May 14.

PACIFIC COAST ELECTRICAL ASSOCIATION—Annual Convention, Las Vegas, Nevada, May 14-16.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Design Engineering Conference, concurrent with Design Engineering Show, Convention Hall, Philadelphia, Pa., May 14-17.

ILLINOIS INSTITUTE OF TECHNOLOGY—Industrial Nuclear Technology Conference, Museum of Science & Industry, Chicago, Ill., May 15-16.

GREAT LAKES POWER CLUB—Wagon Wheel Hotel, Rockton, Ill., May 17-18.

NEW YORK STATE SOCIETY OF PROFESSIONAL ENGINEERS—30th Engineering Industries Exposition with Annual Convention, Statler Hotel, New York City, May 17-19.

INDUSTRIAL HEATING EQUIPMENT ASSOCIATION, INC—Spring Meeting, The Homestead, Hot Springs, Va., May 20-23.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION—Business Development and Personnel Section Meeting, Benjamin Franklin Hotel, Seattle, Wash., May 21-23.

AMERICAN MANAGEMENT ASSOCIATION—General Management Conference, Hotel Roosevelt, New York City, May 23-25.

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS—Annual Meeting, Ambassador Hotel, Atlantic City, N. J., May 23-26.

CIGRE—16th Annual International Conference, Paris, France, May 30-June 9.

JUNE

EDISON ELECTRIC INSTITUTE—24th Annual Convention, Traymore Hotel, Atlantic City, June 4-6.

NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS—48th Annual Convention, Ambassador & Chelsea and Ritz Hotels, Atlantic City, N. J., June 11-14.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Semi-Annual Meeting, Statler Hotel, Cleveland, Ohio, June 17-21.

AMERICAN SOCIETY OF TESTING MATERIALS—59th Annual Meeting & 12th Apparatus Exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J., June 17-22.

FIFTH WORLD POWER CONFERENCE—Vienna, Austria, June 17-23.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION—Accounting & Business Practice Section, Multnomah Hotel, Portland, Oregon, June 21-23.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—Accident Prevention Committee Conference, Hotel Roanoke, Roanoke, Va., June 22.

***WISCONSIN UTILITIES ASSOCIATION**—Accounting Section Convention, Schwartz Hotel, Elkhart Lake, Wis., June 24-26.

***MICHIGAN ELECTRIC ASSOCIATION**—Annual Convention, Grand Hotel Mackinac Island, Mich., June 24-27.

* Additions this week.

SCHEDULE OF AIEE GENERAL MEETINGS, 1956–1961

Date	Location	Meeting
1956		
June 25–29	San Francisco, Calif.	Summer & Pacific General
Oct. 1–5	Chicago, Ill.	Fall General
1957		
Jan. 21–25	New York, N. Y.	Winter General
June 24–28	Montreal, Quebec	Summer General
Aug. 28–30	Yakima, Wash.	Pacific General
Oct. 7–11	Chicago, Illinois	Fall General
1958		
Jan. 20–24	New York, N. Y.	Winter General
June 23–27	Buffalo, N. Y.	Summer General
Aug. 19–22	Sacramento, Calif.	Pacific General
Oct. 27–31	Pittsburgh, Pa.	Fall General
1959		
Jan. 19–23	New York, N. Y.	Winter General
June 22–26	Seattle, Wash.	Summer General
Oct. 12–16	Chicago, Ill.	Fall General
1960		
Feb 1–5	New York, N. Y.	Winter General
June 20–24	Atlantic City, N. J.	Summer General
Oct. 10–14	Chicago, Ill.	Fall General
1961		
June 19–23	Ithaca, N. Y.	Summer General

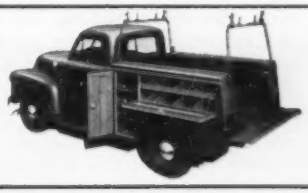
POWERS American SERVICE BODIES AND EQUIPMENT

The 1 Source
for utility bodies and equipment!

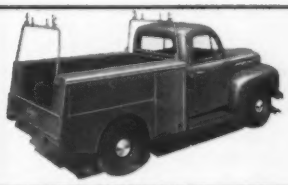
If your work calls for one service body or a hundred . . . if you can use standardized units or require custom-made equipment . . . you'll find a body to fit your needs in the Powers-American line. Ladders, reels, racks, hooks, brackets, shelves, and other special items of equipment, can be furnished for your particular work requirements.

May we help you with your service body problems? Complete details will be sent upon request.

Series 44L and Series 44 (shown above) designed for any general service work. Fully-equipped with shelves and bins. For ½, ¾, 1, and 1½ ton chassis.



Series 25T and 35T arranged for telephone installation and service. Widely used in other phases of utility work. Available in ½ and ¾ ton sizes.



Series 25M and 35M used for all types of general service. Especially suitable for electric meter installation and maintenance. Models for ½ ton and ¾ ton vehicles.

Series 25G and 35G designed for use in the installation and servicing of gas meters. Equipped with meter hold-downs, bins, and pipe rack. In ½ and ¾ ton sizes.

POWERS-AMERICAN DIVISION

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THESE FARMERS, paid on piece work basis, save up to 50% of line cost by "self help"

Farmers Team up with Utility to . . .

Build Rural Line Extensions Through 'Self-Help' Program

A "self-help" program of extending electric service to fringe area farms last year has been called a considerable success by Saskatchewan Power Corp, Regina. The company, currently serving about 112,000 farms, estimates the experiment increased 1955 rural line mileage 7% in Saskatchewan Province.

The program is for farmers who cannot otherwise afford costs of running extensions to rural feeder lines. Under "self-help," they team up under corporation supervision to erect poles to their individual farmsteads. Paid by the utility on a piece-work basis, they save up to 50% of the total line cost.

Marginal Areas Located

This is how the program is handled: The corporation finds a marginal area in which farmers want electric power but can't afford the initial cost. It may have difficult terrain or ground too wet for regular crews and equipment. Surveying, staking, and training in setting poles and mounting attachments are handled by regular crews who later string line and install transformers.

An important asset to "self-help" success is the calibre of the project foreman. He's a utility employee elected by the farmers as "go-between." He must be a first-class lineman. It helps, too, if he's a born diplomat, a natural organizer, professional educator, and a handy man around the farm.

Success Key is "Hands-Off" Pay Policy

Saskatchewan Power delivers 30 and 35-ft poles to the nearest railway siding where the farmers take over. Each farmer group gets $6.50 per pole which they share in any equitable manner. Key to a successful program is to set high standards of workmanship but maintain a "hands-off" policy on how payment per pole is shared. In this way, the thankless task of deciding whether the shovel-wielding farmer did more than the man with the tractor is avoided.

A fair split of the $6.50 a pole is offered, however: $1 for hauling and spotting; $1.50 for digging a hole, 18 in. by 6 ft minimum; $2.50 for raising, tamping, and anchoring; $0.50 for installing hardware; and $1 to the farmer who, in the opinion of the group, worked hardest or lent the most useful machinery.

There were doubts about the program at first, Saskatchewan Power reports. Company crews were on schedule for the goal of 7,500 rural hook-ups in 1955. Several rural communities, though, weren't likely to get service. Heavy rains had spoiled the wheat crop, and the farms were marginal. Few of them were prospects for more than 125 kwhr a month.

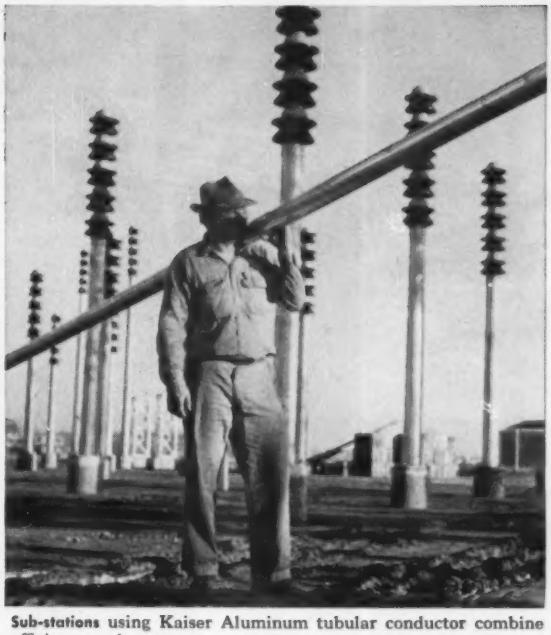
Thus the company was astounded at enthusiasm shown when it suggested the farmers might help. The idea, brought up before in more prosperous areas, simply hadn't interested farmers.

Quality of "self-help" workmanship was reported to be high, far higher than the company ordinarily expects from green crews. "But, after all, it's their own line to their own farm that they're putting up," said E. J. Durnin, SPC engineer in charge. The corporation also found that farmers can work fast. Some groups ran 90 poles a day, as good as the best regular crews.

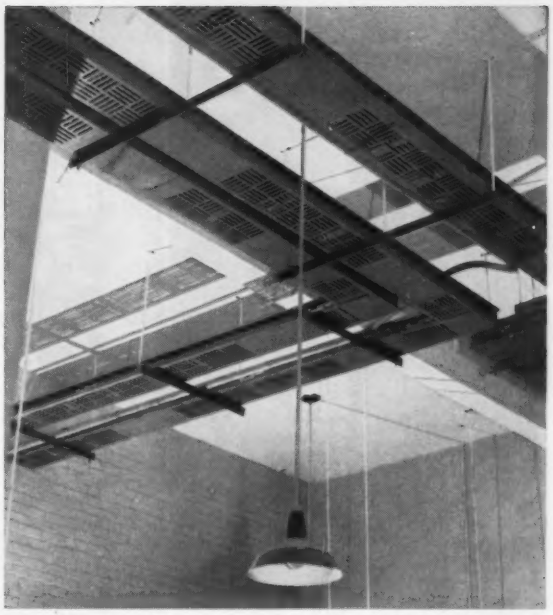
One reason for the fast, efficient work is that handy farmers learned the tasks easily. Also, they were left alone to test their ingenuity in use of their own machinery.

(*Continued on page* 41)

SOME FARMER GROUPS ran 90 poles a day, as good as Saskatchewan Power Corp's best line crews. Each "self help" team gets $6.50 per pole, saves up to $400 for each farmer



Sub-stations using Kaiser Aluminum tubular conductor combine efficiency and economy.



Duct systems cost less, are easier to install with Kaiser Aluminum rectangular bar.

For big savings on bus costs . . . think of Kaiser Aluminum

YOU SAVE on material costs when you specify Kaiser Aluminum bus conductors instead of copper for an equivalent installation.

That's because lightweight Kaiser Aluminum not only costs less per pound of material than copper, but takes only one-half the number of pounds for equal conductivity.

In addition, the light weight of Kaiser Aluminum bus makes installation easier, faster, more economical.

On your next bus installation, take advantage of Kaiser Aluminum's unique combination of properties including high conductivity, light weight, corrosion-resistance, workability, strength, and economy. Available in rectangular, solid round and tubular shapes in a wide range of sizes and constructions.

For complete information, contact the Kaiser Aluminum sales office listed in your phone directory, or your nearby Kaiser Aluminum distributor. Kaiser Aluminum & Chemical Sales, Inc. General Sales Office, Palmolive Bldg., Chicago 11, Illinois; Executive Office, Kaiser Bldg., Oakland 12, California.

Joining Kaiser Aluminum bus conductor by welding, brazing, or soldering, can be done easily with suitable equipment and little training. ▶

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Availabilities, properties, advantages and methods of joining and bending aluminum electrical bus conductors are detailed in this new 12 page brochure. For your free copy, please mail the coupon at right.

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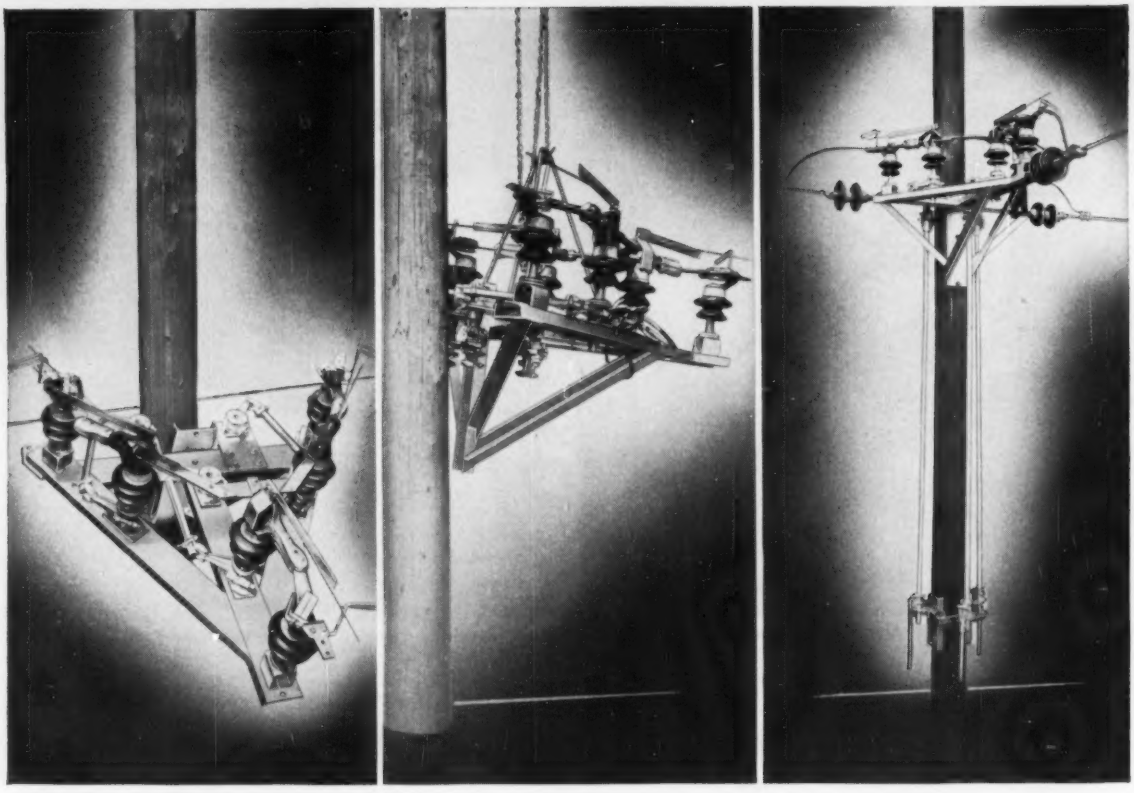


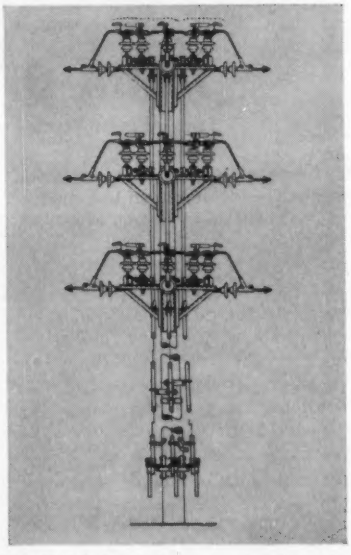
Expansion problems solved quickly with DELTA-STAR Type TH Pole Top Switches

Does time sometimes run short on your expansion projects? Is ground space sometimes at a premium? If you have these or similar problems, you may readily solve them with the installation of Delta-Star Type TH Pole Top Switches.

Installation of Type TH Switches is quick and easy because the switches, bases and frames are mounted as an integral unit. There are no separate units to install. Each switch has a simplified, independent operating mechanism, permitting 3-phase operation from ground level.

Quick-whip arc suppressors eliminate heavy arcing during interruption of line and transformer charging current up to 15 amperes. Standard open gap spacings meet or exceed AIEE and NEMA guarantees.

Type TH Switches can be installed at less than ¾ the cost of conventionally-mounted air switches. It will pay you to check into them soon. Call your nearby Delta-Star representative.



Type TH Pole Top Switches may be obtained for 2-way or 3-way switching, in 400 and 600 ampere ratings, and 7.2 to 69 kv. For complete data, write for Bulletin T-5511.

DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.

2437 Fulton Street · Chicago 12, Illinois · District Offices in Principal Cities

'Self-Help' Program

(*Continued from page* 38)

Some groups designed and built hydraulic lifting gear for tractors. Others made good use of their hay-lifting devices.

From Saskatchewan Power's standpoint, an attractive "self-help" feature is the way sign-up and easement problems are simplified. It shoots for an 85% sign-up before electrifying an area but will settle for 65%. The program can boost sign-up to 90%. Easement problems are smoothed out because farmers doing their own work raise no objections to pole placement or location on their land.

Nevertheless, there are limitations to "self-help." Most important is that potential savings for the majority of farmers simply isn't worth the effort. A typical project involves 30 farms, 33 farmers and about 35 miles of single-phase, earth-return line. For setting 470 poles and 105 anchors, farmers will be paid about $3,000. Individual payments will range from $10 to $400.

The corporation charges from $400 to $500 a farm, including transformer, to run a 14.4-kv feeder line to the farmstead. So, savings in some cases can be very small. Savings in proportion to total cost would be even less if no subsidization were involved in tapping onto the feeders.

Cost to a Saskatchewan farmer is less than half that in neighboring Alberta Province where the farmer bears all cost to deliver. But the Saskatchewan farmer pays far more than his Manitoba neighbor who gets service to his farm without charge.

The almost 100% use of single-phase, earth-return construction holds the Saskatchewan farmer's costs down. Nearly 75,000 miles of it were constructed in the last four years throughout the wheat-growing areas.

As a second limitation, there are regions where "self-help" is a logical approach, but farmers can't team up and work in harmony. Furthermore, if terrain is reasonably good, and an electrification project will keep a full-time crew rolling, the company prefers to set the poles itself because this job is actually only a small part of the total program.

Feather River Expansion Slated for Summer Start

Pacific Gas & Electric Co will start work this summer on a $32.6-million project on the north fork of the Feather River in northern California —part of a program to add 364,000 kw of generating capacity on the river.

The project involves construction of the Butt Valley and Caribou 2 powerhouses and related works, with a combined generating capacity of 145,000 kw. Still to be scheduled is construction of Belden powerhouse, 113,000 kw, at an estimated cost of $25.8 million. Last summer the company started construction of the $34.9-million Poe powerhouse project, which will have a generating capacity of 106,000 kw.

First to be constructed will be tunnels for Butt Valley and Caribou 2 hydro powerhouses. Work on access roads to the two sites will start early in May, and tunnel construction will begin by July 1.

Butt Valley powerhouse will be located at the upstream end of Butt Valley reservoir. A concrete-lined pressure tunnel two miles long and 13 ft in diameter and a steel penstock pipe 6,700 ft long will convey water to the plant from Lake Almanor.

Caribou 2 powerhouse will be adjacent to the existing Caribou powerhouse on the Feather River. A pressure tunnel 1¾ miles long and 12 ft in diameter and 2,400 ft of penstock will carry water to the plant from Butt Valley reservoir. An afterbay dam 150 ft high will be built about a mile downstream from Caribou 2 powerhouse.

When the entire development is completed, PG&E will have 10 plants on the north fork Feather River, with combined generating capacity of 750,000 kw.

Yankee Atomic Buys Site

Yankee Atomic Electric Co, a group of 15 New England utilities, acquired 1,283 acres of land recently near Rowe, Mass., for its 134,000-kw nuclear power plant. New England Power Co, a participant, has purchased the land in the past 18 months for a total cost of about $84,000. The site borders the Deerfield River.

POWER BRIEFS

● Gas produced by burning coal underground may give England a cheap source of power plant fuel. Midland pilot stations have averaged less than 3.5¢ a therm in six years of tests, compared with coal cost of 4¢ a therm. The process may tap estimated 500-million tons of United Kingdom coal now uneconomical to mine.

● Work started on 90,000-kw, $16.4-million unit for Pennsylvania Power Co's West Pittsburg Plant recently. The addition will up plant's capacity to 263,000 kw after completion in fall of 1958.

● Noxon Rapids Dam construction for Washington Water Power Co started first week of April. Morrison-Knudsen Co, Boise, Idaho, won major bid of the $87-million, 400,000-kw project near Thompson Falls, Mont.

● Consolidated Edison Co set a $650-million, five-year budget in its annual report. Nearly one-third is for added generating capacity including proposed Buchanan nuclear plant to be started in 1957.

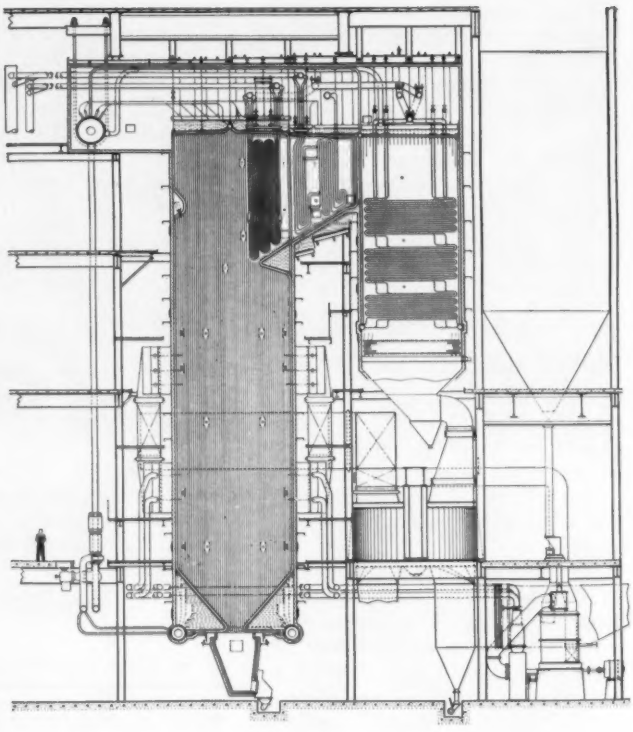
● Utah Power & Light Co plans to start soon on a 100,000-kw plant, probably at Castle Gate, Utah. The addition, set for 1957 completion, is part of $18-million 1956 budget for UP&L and its subsidiary, Western Colorado Power Co.

● A five-year, $230-million budget, announced recently by Houston Lighting & Power Co, will go mainly for added generating capacity. The company anticipates demand of about 2-million kw by 1960.

MYSTIC STATION

C-E controlled circulation boilers

Boston Edison Company



The C-E Unit shown above is presently in process of fabrication for the Mystic Station of Boston Edison Company at Everett, Massachusetts. Jackson & Moreland are the Consulting Engineers.

This unit is designed to serve a 125,000 kw turbine-generator, operating at a throttle pressure of 1900 psi with a primary steam temperature of 1000 F, reheated to 1000 F.

It is of the controlled-circulation, radiant, reheat type with a divided furnace. The reheater surface is located between the primary and secondary superheater sections, and economizer surface is located below the rear superheater section. Regenerative type air heaters follow the economizer surface.

Pulverized coal firing is employed, using bowl mills and tilting, tangential burners. Arrangements are made for the use of oil as an alternate fuel as desired.

B-923

COMBUSTION ENGINEERING, INC.

Combustion Engineering Building
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STEAM GENERATING UNITS; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; HOME HEATING AND COOLING UNITS; DOMESTIC WATER HEATERS; SOIL PIPE

Steel Enclosures Serve Home Area

HOWARD S. SMITH, Distribution Engineer, Colorado Central Power Co, Englewood, Colo.

Small metal enclosures that may be used singly or in multiple have been designed by Colorado Central Power Co to serve a 2.4/4.16-kv residential underground distribution system. The enclosures are used as transformer housings and cubicles for bayonet-type cutouts and switches.

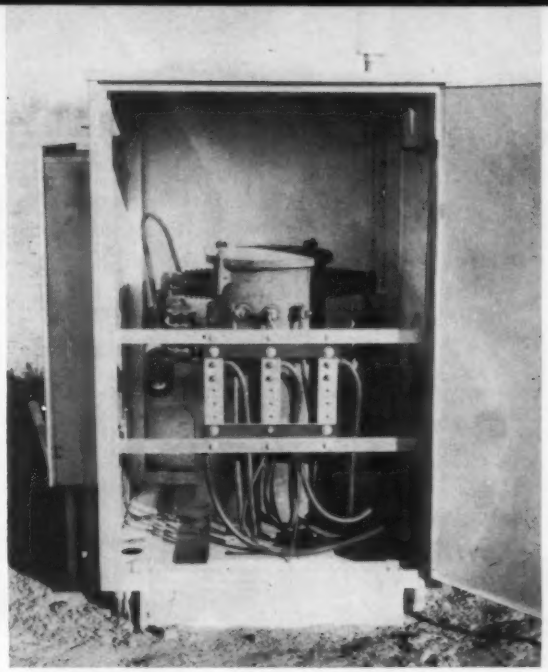
The housings are the only above-ground portion of the primary system consisting of three, single-conductor 4/0 cables laid in 3-in. conduit along rear property lines. Conductor is a 5-kv unshielded butyl rubber insulated cable with a Neoprene jacket. This type is preferred to a shielded cable because of the lower cost of cable and terminations.

Basically, the system is a loop, with sectionalizing switches feeding laterals wherever possible. Service can be restored to any transformer tapped to the loop by removing the faulted cable at the termination pad inside the transformer housing and reclosing the proper switches.

Enclosures consist of 12-gage steel, measuring 40 x 36 x 54 in. and mounted on a reinforced concrete pad. They are vented and have two doors for greater accessibility. Enclosures have one coat of aluminum paint inside and out to reflect the high level of solar radiation at higher altitudes.

Transformer enclosures can house a 50-kva self-protected type of transformer. At the far ends of primary laterals, transformers are equipped with external lightning arresters. Primary cable is brought into the housing through conduit in the pad and then to bayonet-type disconnects.

Insulated buses mounted on angle irons provide for connections of customer services to the transformer secondary. Services consist of two 1/0 copper conductors and a No. 2 copper neutral run in a 2-in. non-metallic duct parallel to the primary duct line along the rear property. Transformers feed an average of four customers each.



ENCLOSURE can house 50-kva self-protected type transformer

Switchgear cubicles house three sets of fused bayonet-type cutouts separated by Transite barriers. Switches and insulators are mounted on a channel-iron frame.

To test the adequacy of the switches and enclosures under short-circuit conditions, a 3-phase short was placed in a transformer housing one cable run distant from a switch cubicle. Switches were fused, and the station recloser was closed. Fault current was determined at about 2,000 amp.

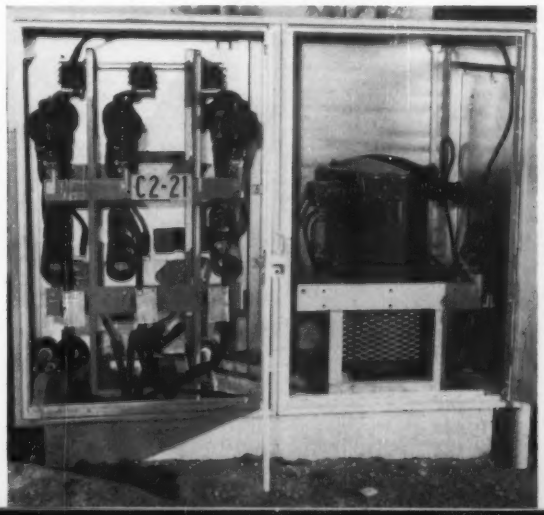
Blowing of the fuses resulted in a slight temporary expansion of the enclosure, with considerable smoke escaping from vented and crackage areas. There was no apparent damage to the Transite barriers and only slight arcing on the sides of the transformer housing. It is felt that both the enclosures and cutouts will withstand short-circuit faults considerably in excess of that produced in this test.

Approximate costs for this distribution system are: Electric service per building site, $510; transformer housing installed, $600; switchgear cubicle with nine switches installed, $800; ratio of underground system to equivalent 7.6/13.2-kv overhead circuits, 4.5 to 1.

The normal distribution for this area is 7.6/13.2-kv. If the cost of an equivalent 2.4/4.16-kv overhead system is used, the ratio of underground to overhead cost would be lower.

Colorado Central Power has an improved design for future underground systems wherein the meter and service pull box will be adjacent to the transformer housing. This will separate the high-voltage circuits from the secondary lines to eliminate hazard when customer services are being enclosed.

CUBICLE houses three sets of bayonet-type cutout switches



DISTRIBUTION TRANSFORMERS

THIS CORE AND COIL

COULD SAVE YOU...$30

Estimate your possible savings in terms of all transformers on your lines

Buying a new 5-kva distribution transformer costs about $95. A General Electric Service Shop, however, will completely rebuild and uprate one of your old 1 1/2- or 3-kva transformers to 5 kva for only about $65. You save $30 and get a new-transformer warranty. Multiply this $30 saving by the number of transformers you must either uprate or replace every year, and your savings are significant. You make even bigger savings in uprating higher-rated units.

G.E.'s uprating service saves you money. When rebuilding your old transformer the shop installs a new factory-built core-and-coil of the highest rating suitable for the old tank. A conventional 1 1/2-kva, 2400-volt transformer can be uprated to 5 kva, either 7200 or 7620 volts, and converted to a self-protected type if you wish. Both routine rebuilding and emergency repairs are as near as your telephone—there are 34 G-E service shops in major cities.

Look at the other money-saving features that prove "all transformers are not alike": **Impulse testing,** for instance, saves years of transformer life. **One-piece clamping bands** save maintenance time. Re-usable **Nitrile rubber gaskets** help save units from contamination. **AL/CU terminals** are designed to prevent both copper and aluminum conductors from loosening. **Strenicor terminal clamps** save terminals from breaking. **Super Melaglyp paint** saves up to two repaintings. **Nationwide warehouses** save utilities heavy inventory expense.

For the complete story, contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to General Electric Company, Section 431-40, Schenectady 5, N. Y.

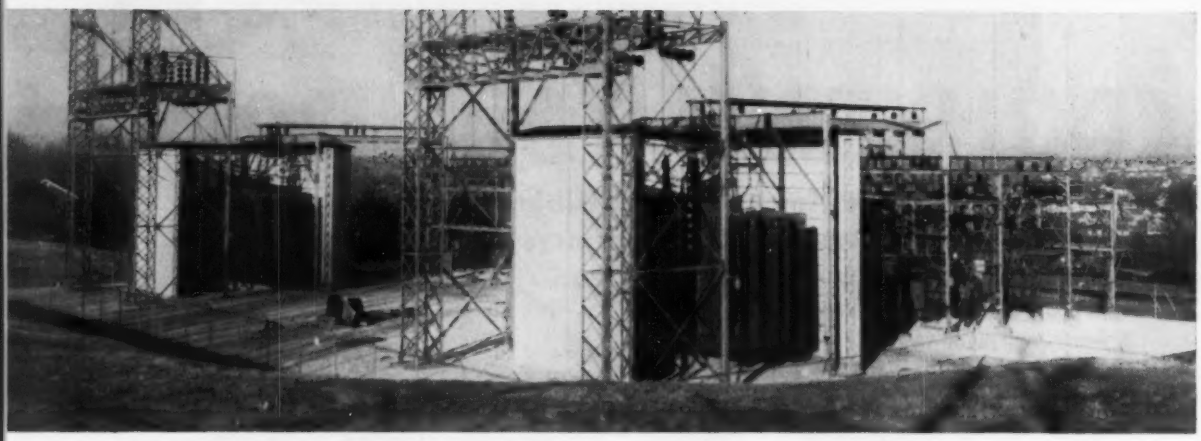
dollar-saving features prove ATANA*

***ALL TRANSFORMERS ARE NOT ALIKE**
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	√			√		√
Nitrile rubber gaskets	√					√
One-piece clamping band	√					
H-v and l-v terminals handle both copper and aluminum conductors	√					
Strenicor pressure terminal clamps	√					
Super Melaglyp paint	√					
More than 100 warehouses	√	√				
Nationwide, company-operated service shops	√	√				

Progress Is Our Most Important Product

GENERAL ELECTRIC



How to Quiet a Residential Sub

J. R. WILSON, General Electric Co, Schenectady, N. Y.

There are three considerations in obtaining a quiet residential substation. They are: Selecting the site; building sound barriers; and using a quiet-type transformer.

. . . Selecting the Site

A knowledge of noise characteristics and an investigation of the noise control requirements of each proposed substation site constitute an economic necessity. If a site is purchased solely because of its initial price, the cost of correcting a noise complaint may make it ultimately a poor choice both in dollars and customer good will.

Since sound generally travels along a line of sight, the substation should not be located in a low spot or in a section surrounded by apartment houses. Preferably, the substation site should be the largest available. This allows the greatest natural attenuation of sound over the distance from the transformer to the point of sound interest.

A corner lot has advantages over a site in the middle of the block. The two streets afford additional space, and the several feeders can be brought to separate poles. The over-all result is a better looking and quieter substation.

If a property owner feels that the value of his property is reduced by a nearby substation, he will resent any transformer noise. So, in this respect, appearance and noise control can be considered together. These neighbors can be kept happy if the appearance of the substation property is improved beforehand and if the actual installation is executed quickly and with the least possible confusion and noise. This entails additional planning and organizing, but a complete package substation requires a minimum of this extra work.

If the ambient noise level at the proposed substation site is high, it may help to mask or hide the transformer noise. However, this is true only if the ambient contains the predominant frequencies of transformer noise—usually 120, 240 and 360 cps. A network sound analyzer should be used to measure the sound-pressure level (SPL) in the various frequency bands individually. Experience has shown that an acceptable installation can be attained in a typical residential area if the SPL of each single tone is from 0 to 5 db below ambient sound level. These sound measurements are made with the 40-db weighting network since transformer manufacturers are committed to that network for NEMA noise measurements.

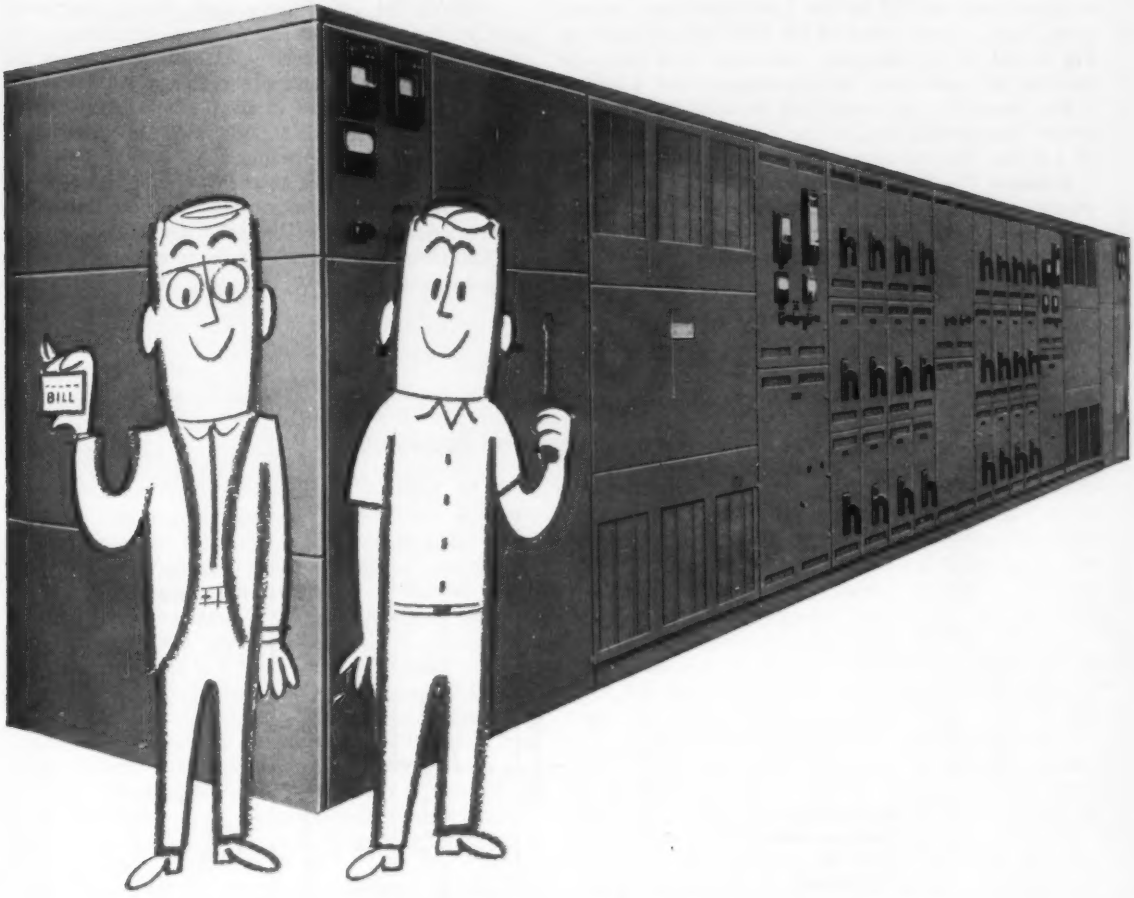
(*Continued on page* 48)

Will It Be a Noisy Substation?

The following steps indicate whether a proposed installation is likely to constitute a transformer noise problem

1. Determine:
   a. Transformer kva and kv ratings
   b. Distance from transformer to point of noise interest
2. Determine ambient noise level by:
   a. Measurement; or by
   b. Estimating from Table I
3. Obtain transformer sound level at interested point by consulting Fig 1 or 2
4. Desired transformer sound level at point of interest should be 0 to 5 db below ambient
5. If Step No. 4 is not satisfied, determine the sector about the transformer which requires noise reduction:
   a. For narrow sector of less than 120°, a barrier of 1 or 2 walls is suggested, designed to meet requirements of Fig 3
   b. For wide sector of more than 120°, a barrier of 3 walls is suggested, designed to meet requirements of Fig 3
   c. For a general area, 360°, quiet type transformer or 4-wall barrier is suggested, as described in text

I-T-E Secondary Unit Substations



. . . designed and built for economy in installation and operation

I-T-E Secondary Unit Substations bring electric power nearer to where you use it—make it more dependable—save you time and money.
They do it in several ways:

- By bringing higher voltages nearer the load and reducing power losses
- By reducing voltage drops inherent in long low-voltage runs and increasing machine efficiency
- By saving space—all necessary components are housed in one functionally designed unit
- By cutting delivery and installation time—units are assembled, tested and shipped ready for immediate installation from one source of supply
- By protecting plant personnel—all live parts are isolated and metal enclosed

I-T-E Secondary Unit Substations can be supplied for any application indoor or outdoor, and in any standard rating. For complete information, contact your nearest I-T-E sales office. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Phila. 30, Pa.

I-T-E

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

. . . Transformer Noise Nomogram

If it is inconvenient to take a complete set of measurements at a proposed site, the SPL of the transformer at the point of interest—perhaps the nearest residence—may be found with the aid of the transformer noise nomogram, Fig 1. Construction of the nomogram is based on Fig 2, and on the fact that transformer tank size is a function of transformer kilovolt-amperes and kilovolts.

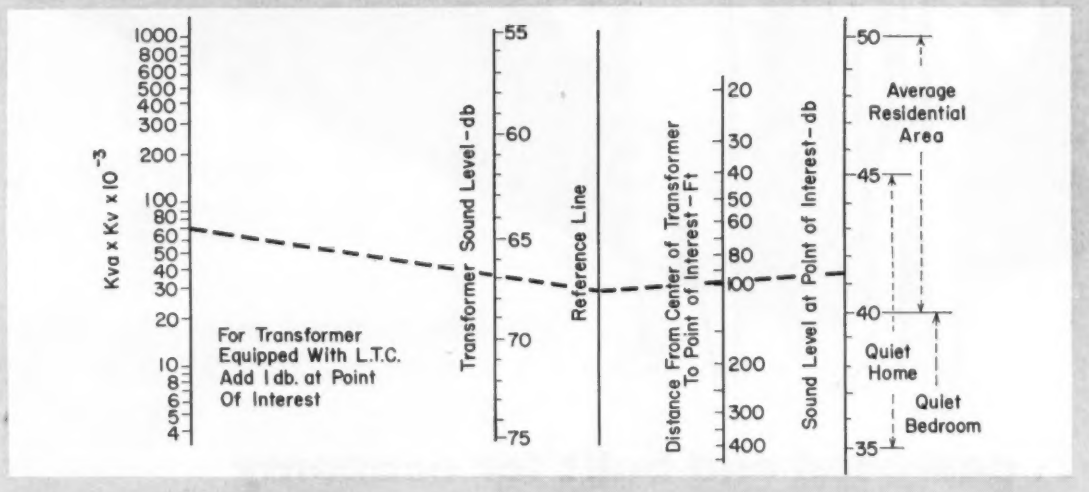
For simplicity, the nomogram is limited to 3-phase power transformers and to the predominant frequency of 120 cps. Its operation is illustrated by this example.

Example: One transformer is rated 5,000 kva, 13.8 kv primary voltage and is equipped with load-tap-changing mechanism. Therefore, kva times kv equals 69,000. The NEMA standard level for this transformer is 67 db, according to Table II, "Standard Transformer Audible Sound Levels." Assume that the point of interest in this case is 100 ft from center of the transformer.

To use the nomogram, draw a line from the 69,000 point on the kva x kv line through the sound level of 67 db to the reference line. From the point obtained on the reference line, a new line is drawn through the 100-ft mark on the point-of-interest line and terminating at a point-of-interest sound level of 41.3 db. Because of the increase in core and tank size necessary with load-tap-changer, one db is added to give 42.3 db. This one db increase does not include the sound of the tap-changing mechanism when it is operating.

The nomogram can be checked by referring to Fig 2. This transformer would most nearly be represented by a position midway between the solid and dotted lines on the 5,000-kva unit. At 100 ft the average SPL would be approximately 42.5 db.

Fig 1—Transformer Noise Nomogram



. . . Building Sound Barriers

If sound reduction is required over a large area, it can generally be obtained by partially enclosing the transformer. A wall that is properly designed and placed can usually furnish ample sound reduction.

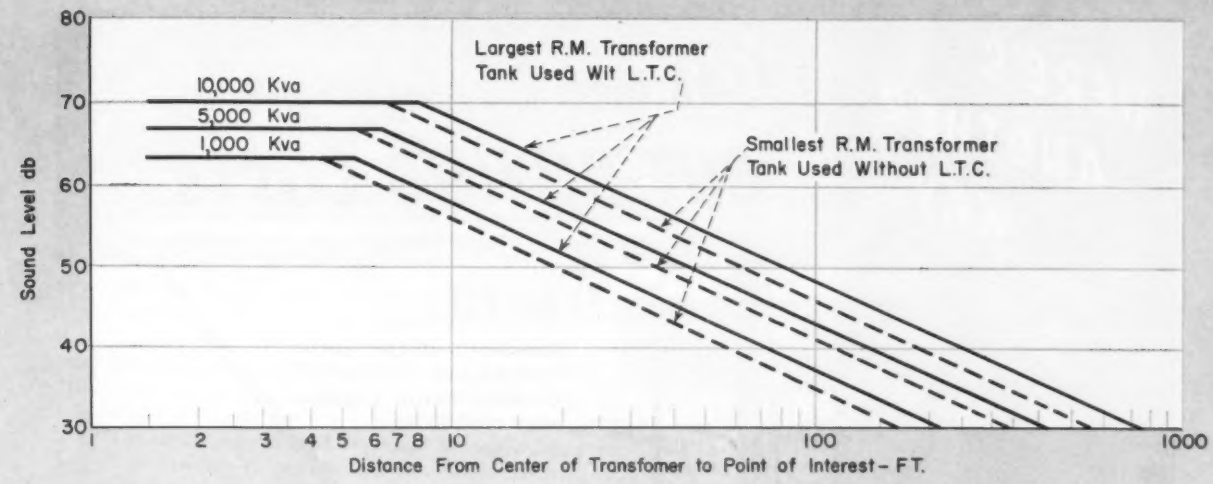
There are three factors to consider in designing an effective sound barrier. They are transmission loss through the wall, diffraction of sound waves around the sides and top, and sound pressure build-up within the enclosure.

Transmission loss directly through a solid masonry wall is generally in the order of 30 to 40 db. For example, if SPL measurements show a reading of 70 db on the side of a wall adjacent to the sound source and if the reading on the opposite side is only 30 db, the transmission loss through the wall is 40 db. This means that 0.01% of original sound intensity is transmitted through the wall. For most outdoor installations, the average masonry wall is considered to transmit no sound energy.

Diffraction is generally the limiting consideration in the design of a sound barrier. This analogy is useful in predicting the noise attenuation of a given wall and transformer combination. Tests with models in the General Electric sound laboratory verify this assumption, and Fig 3 is based on results of the test. The curves in that figure provide a practical guide for designing, at any given decibel loss, both the height and position of a barrier.

For a given barrier height, the closer the barrier is to

Fig 2—Average Transformer Sound vs Distance from Transformer Center



the transformer tank, the greater the sound reduction will be. The number of sides required for a barrier depends on where the sound reduction is desired.

A single-wall barrier does not appear functional, is difficult to landscape, and has limited use because of diffraction about the ends. A two-wall, L-shaped enclosure is a better solution and a more complete structure. If properly designed, this barrier will usually provide the necessary reduction in noise level over an area of approximately 120 deg. A three-wall, U-shaped enclosure is simply an extension of the two-wall barrier and gives sound reduction generally greater than 180 deg.

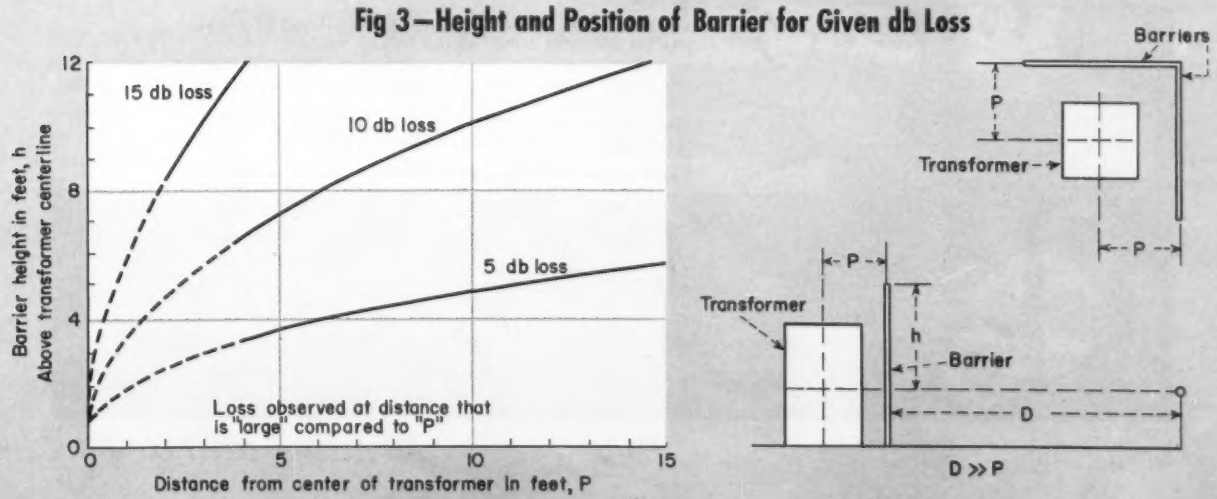
Sound reflection will increase the SPL in front of the open end of the walls. This undesired reflection can be reduced by proper application of acoustic material to the inner surface of the walls.

The reduction in SPL obtainable with a four-wall barrier does not correlate with the values predicted by the diffraction theory. An enclosure of this type acts as a short, open-ended tube, and therefore the noise reduction obtainable is relatively independent of the height of the walls. As a practical guide, the height of the four walls should be approximately 2 to 4 ft above the top of the transformer cover. Under these conditions, a properly designed four-wall enclosure should give approximately a 10-db reduction around the transformer.

The next step in sound barrier construction is a complete enclosure—four walls and a roof. Sound pressure build-up, sound transmission loss through the wall, and heat dissipation become important considerations for this type of structure. Several companies have placed standard transformers in brick enclosures because of noise problems and restrictions on appearance. In England, at least one transformer has been installed with a masonry sound barrier constructed adjacent to the tank. The radiator connections were extended and the radiators mounted outside the wall. Result—sound reduction of 20 to 30 db.

(*Continued on page* 51)

Fig 3—Height and Position of Barrier for Given db Loss



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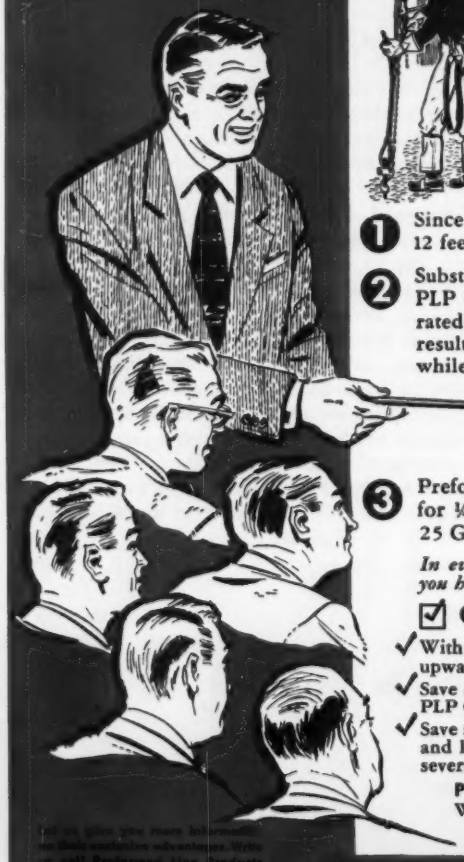
EXAMPLE:

Consider a 40-foot guy—with breaker—using ⅜" Siemens-Martin strand—rated at 6950 lbs.

by using PLP GUY-GRIPS

Strand is terminated here (no looping required)



1 Since PLP Guy-Grips eliminate looping, strand saving of 12 feet or more per guy results. **SAVING: $.67 per guy**

2 Substitute ¼" Extra High Strength Strand—rated 6650 lbs. PLP Guy-Grips make this possible since they hold the full rated strength of E.H.S. Strand. The following strand savings result (current cost of ⅜" galvanized strand is $2.24 per guy while ¼" E.H.S. costs $1.36 per guy)*: **SAVING: $.88 per guy**

TOTAL STRAND SAVING ALONE: $1.55 per guy

3 Preformed Guy-Grips cost only $.55 each for ¼" E.H.S. Strand size. (PLP Cat. No. 25 GDE-¼")

Compare this cost with your current fitting.

In every Preformed Guy-Grip installation, you hold the full strength of the strand.

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- ✓ Save an additional 10% by using 3-wire strand instead of 7-wire. PLP Guy-Grips will hold 3-wire strand equally well.
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PLP GUY-GRIPS ARE ALSO AVAILABLE IN COPPER-WELD, BRONZE, AND STAINLESS STEEL.

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PLP GUY-GRIPS DON'T SLIP . . . even under impact!

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It is important that no openings be made in sound barriers. For example, assume a 10 by 10-ft brick wall which is part of a complete transformer enclosure designed to prevent the escape of sound around the ends or over the top of the wall. The SPL within the enclosure is 70 db, and the barrier has a transmission loss of 40 db. If a 3 by 1-ft hole were cut in the wall for bus work, the average SPL in the direction shielded by the wall would be increased from 30 db (70 - 40 db) to about 45 db. This would probably render the installation unacceptable.

Various materials have been used in building walls around transformers. There seems to be comparatively little difference between such materials as brick, concrete block, and cinder block or pumice block filled with sand, if the total mass is sufficient. Generally, this material is readily available and can be made into a neat, attractive installation.

In several instances, wooden walls have been made of 2 by 4-in. studs covered with layers of fibrous building board and plywood. In one case, these walls were portable and were moved about until the desired sound reduction was obtained. However, because of their lighter mass, the transmission loss through these walls was not as high as with a permanent structure. Generally, masonry is the answer—the end result can be made useful, permanent, and attractive.

However, removing a transformer from a three or four-wall masonry enclosure is a difficult and expensive operation. Several companies have compared the cost and the noise reduction of semi-removable brick panels and two types of removable panels inserted in masonry walls. The latter—one of steel and the other of 2-in. glass fibre batts enclosed in 20-gauge sheet steel—were made up in 150-lb sections. The brick panels employed steel joints in the masonry wall. This feature allowed the access area to be torn out without damaging the remaining wall and to be rebricked when the work was completed.

Results of the investigation appear in Table III, a tabulation of the relative panel costs and of the transmission losses taken directly through the panel. The transmission losses recorded are the result of SPL readings taken on each side of the panel and immediately adjacent to it.

Sound pressure build-up within an enclosure is caused by the reflection of the sound waves from the wall. This has the apparent effect of increasing the sound given off by the source. The build-up becomes especially large if the distance between the wall and the transformer equals one-half of the sound wave length—approximately 4.7 ft for 120 cps. The pressure build-up may be in the order of ½ to 4 db for two walls, 2½ to 4 db for three walls, and 3 to 6 db for a four-wall enclosure.

This build-up can be reduced generally to a negligible value by application of sound-absorbing material to the interior surface of the enclosure. The material should be mounted with wooden spacers so that there is about a 1-ft air space between the insulation and the wall surface. Because of the low frequency of the transformer sound, application of the material directly to the wall surface will not provide optimum results.

The foundation of the enclosing walls should be separate from the transformer foundation. This prevents transformer vibrations from passing directly to the wall and causing it to become a sounding board for the transformer.

. . . Quiet-Type Transformer

Transformers are available with noise levels that are lower than the National Electrical Manufacturers Association's standard. However, they are non-standard and considerably larger. The decision to use a special quiet-type transformer or to build a three or four-sided sound barrier is generally one of economics. However, a quiet transformer plus a sound barrier might be installed in an extreme case.

Table I — Representative Community Ambient Noise Levels

Ambient Noise Level, db	Type of Community*
60	Average industrial
50	Average residential, day
40	Average residential, night
40	Quiet suburban residential, day
30	Quiet suburban residential, night

* These are average values. Variations of ±5 to ±10 db are to be expected.

Table II — Standard Transformer Audible Sound Levels

Kva (Equivalent 2 Winding, 55C)	Sound Level (Average, 40-db Meter)
1,000	62
1,500	63
2,000	64
3,000	65
4,000	66
5,000	67
6,000	68
7,500	69
10,000	70

NEMA Standards TRI – 2.042 & 2.068, May 1954, Class OA, 350 BIL and below

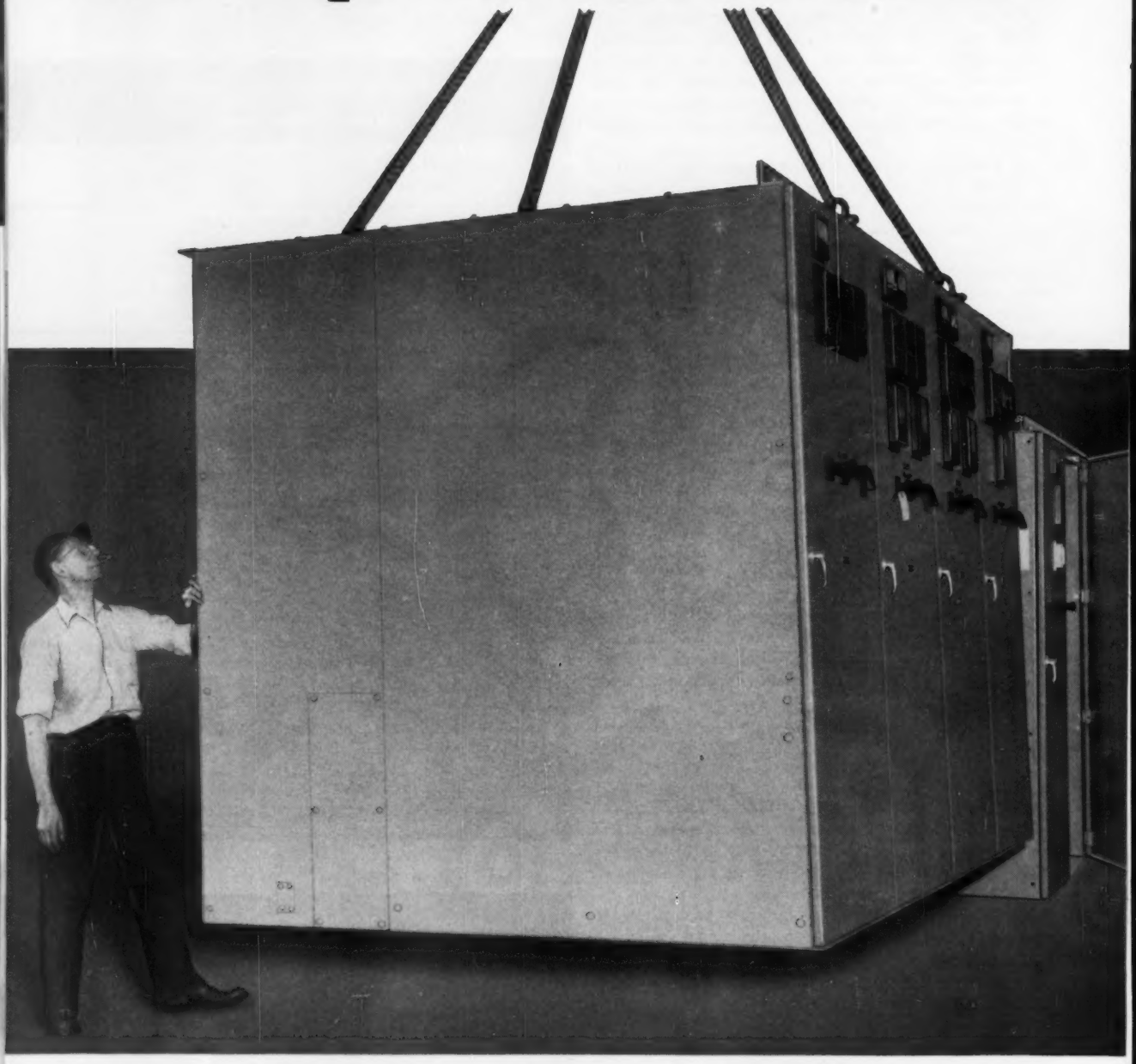
Table III — Cost vs Sound Loss through Removable Panels*

	Brick	Steel	Glass Fiber
Reduction of sound through panel	24 db	12 db	20 db
Relative initial installed cost	100%	75%	205%
Cumulative cost after:			
One removal	206%	85%	214%
Two removals	312%	95%	223%

*AIEE Paper No. 50-179

Allis-Chalmers Switchgear Gives You . . .

6 Ways to Cut Cost of



Lifting is Easy, Too — Two removable shipping angles are bolted to the top of indoor switchgear to facilitate handling if cranes are available.

LIVE BETTER ELECTRICALLY

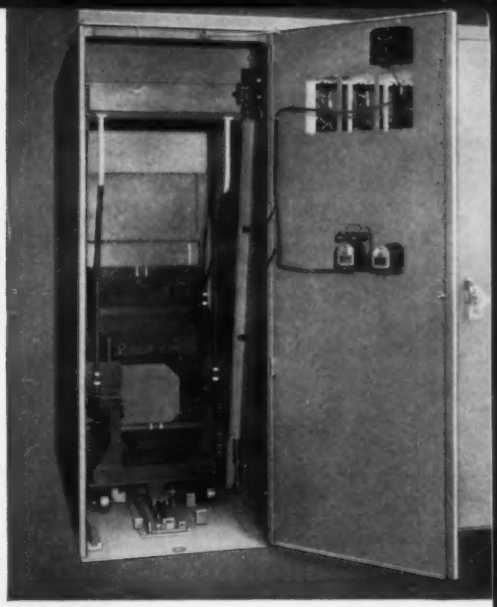
for Progress in Switchgear

ALLIS-

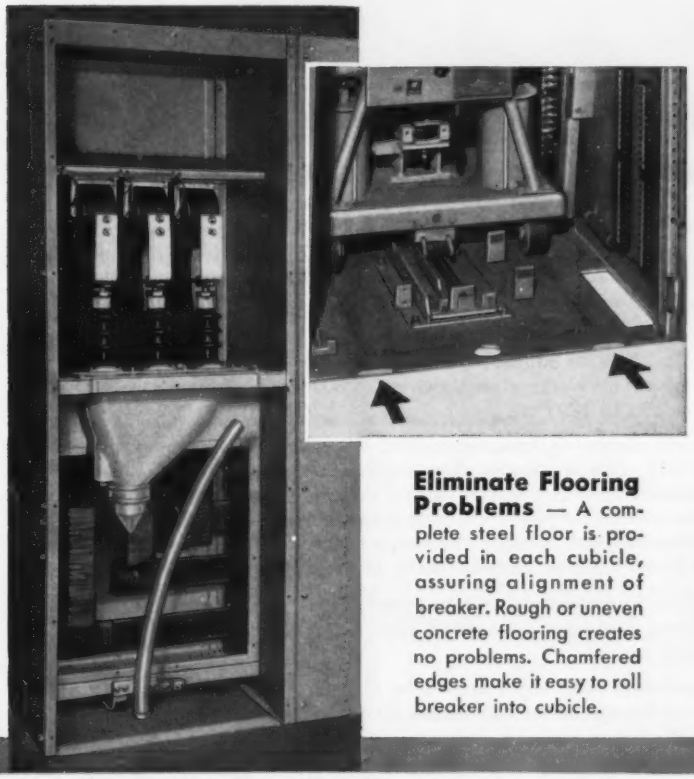
Installation

Every Detail Designed to Simplify Installation...**Save Time and Money**

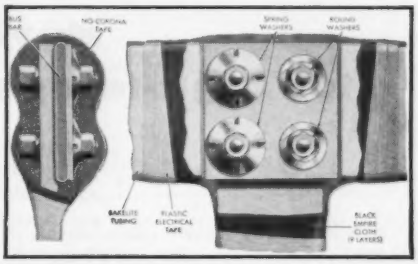
Some of the details are shown on these pages, but ease of installation is only one of the many features of Allis-Chalmers switchgear. For the complete story, contact your nearest A-C office, or write for new bulletin 18B8142. Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.



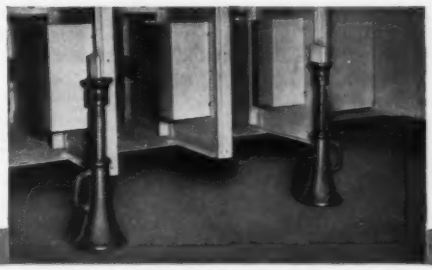
Easy to Align — Factory pre-assembly on level steel channels and use of master jigs make it easy for you to reassemble shipping groups at job site. Secondary wiring is marked at shipping breaks to simplify reconnection.



Eliminate Flooring Problems — A complete steel floor is provided in each cubicle, assuring alignment of breaker. Rough or uneven concrete flooring creates no problems. Chamfered edges make it easy to roll breaker into cubicle.



No Fuss, No Muss in Joining Bus — Dry-type bus joints for connecting shipping groups are quickly made without messy compounds. Can be taken apart easily, in minutes. Note, too, this joint provides for expansion and contraction of bus.



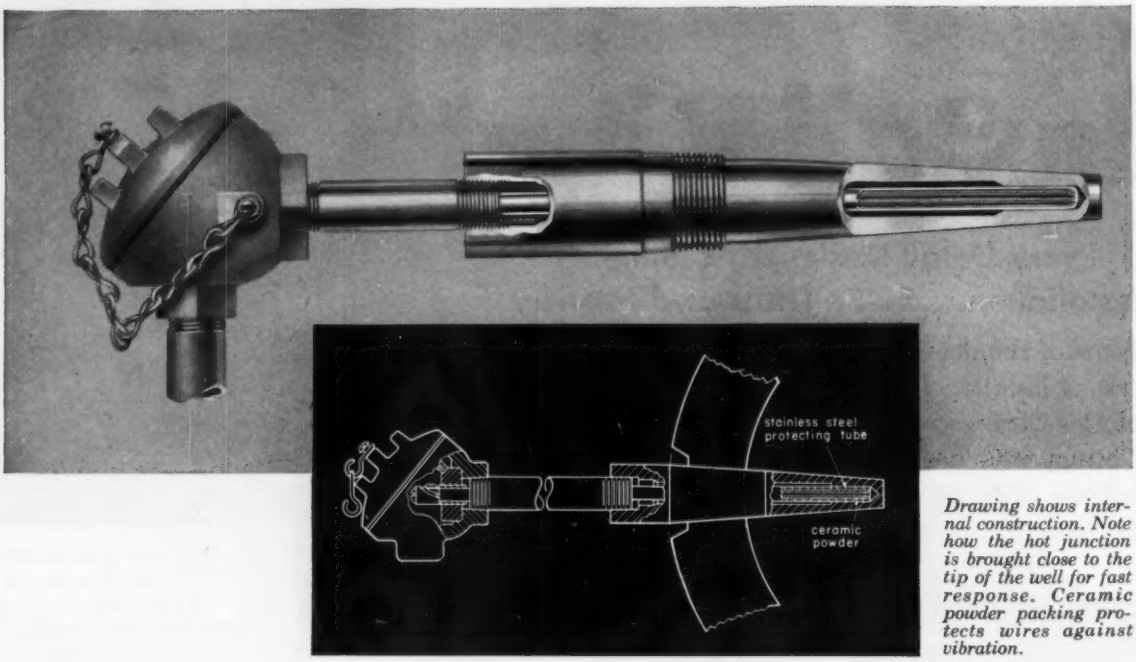
Save Time by Working Ahead — Just slide switchgear over previously installed floor cable. No lifting required, since rear of cubicle has no cross member at floor line. This arrangement makes it possible for you to install cable before switchgear arrives . . . hasten completion of job. Note roomy pothead compartment.

Simple Jacking Arrangement— Where switchgear must be rolled into position, removable jacking bosses supplied with each switchgear group make it easy to raise on jacks and move into place on rollers.

CHALMERS

A-C ALLIS-CHALMERS

A-5076



Drawing shows internal construction. Note how the hot junction is brought close to the tip of the well for fast response. Ceramic powder packing protects wires against vibration.

New Honeywell thermocouple for high-temperature, high-pressure steam

HERE'S a rugged, fast-acting thermocouple that is ideal for sensing temperatures in steam headers and feedwater lines. It's built to stand up under severe vibration . . . in the high temperatures, high velocities and high pressures of modern steam plants.

It is supplied in three styles . . . tapered and threaded, single-tapered for welding in a drilled hole, or double-tapered for pressure fit in a tapered hole. Designs are available for working pressures up to 5000 psig, temperatures to 1250 F., and velocity to 225 fps.

The thermocouple element is protected against vibration by an inert ceramic packing which holds wire in place inside a stainless steel tube. For high-speed response to temperature changes, the ends of the couple wires are fastened to the tip of this tube. The tube fits tightly into a drilled hole in the well... giving a short thermal path between the steam and the thermocouple. Thermocouples can be replaced without danger to personnel.

Either one or two thermocouples can be inserted in a single tube and well assembly, equipped with screw cover head. Either 15 AWG Type J or Type K thermocouples are used.

Your local Honeywell sales engineer will be glad to discuss how this new thermocouple can be applied in your plant. Call him today . . . he's as near as your phone.

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First International Seminar

Round-table plan of problem solving catches on in Latin America; utility men exchange ideas and successful case histories

The art of round-table discussion is moving south. Values of give-and-take exchanges lured, and later enthused, 58 delegates to American & Foreign Power Co's first International Seminar on Industrial Relations which ended March 17 in Mexico City.

The two-week meeting drew utility leaders from 13 Latin American countries and U. S. Topics included the growing importance of personnel training, intra-company communication and safety.

In the opening week, these industrial relations items were covered on the theory-level by A&FP men and experts from Mexico and U. S. Case histories of problem solving ideas were heard in the second week.

A&FP's director of Industrial Relations, R. V. Sear, explained that the Mexico City site was chosen because the company's Mexican subsidiary, Compania Impulsora de Empresas Electricas, boasts the best industrial relations program among A&FP's system.

Impulsora gave one problem that good industrial relations solved. Several years ago, a training program for veteran linemen brought resentment among the men who thought that at that late date they were going to be told how to do their jobs. And the union suspected the program would channel allegiance away from it to the company. The solution? Impulsora told workmen and the union about the program on a human level, emphasizing safety aspects. Then everyone played a part, round-table-wise, in drafting a successful training program slate.

Many delegates told of ideas the Seminar had generated. Some examples:

The "how to" knowledge of stepping up supervisory training to match rapid company growth was a gain claimed by Raul Fernandez Llorca, assistant personnel director, Compania Cubana de Electricidad.

"Up to now," Rafael Herrera said, "in safety meetings and so forth, we've been doing all the talking. This Seminar has pointed up the value of listening, too." Operations superintendent for Compania Chilena de Electricidad, Ltd, Herrera added that having employees take part in round table sessions might be the answer to bringing management and labor closer together.

F. F. Purdy, director of safety and training, Compania Panamena de Fuerza y Luz, said in the first week's theory talks "we obtained food for thought." In the final week "we received the tools with which to carry out those ideas."

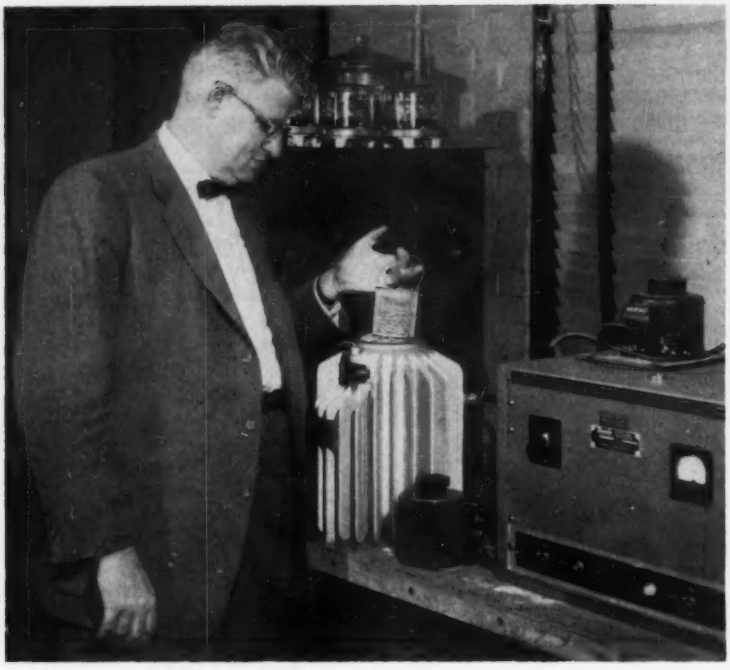
Site for next year's seminar has not been chosen yet. With operating companies in 11 Latin American nations, A&FP's plans are to hold the meeting in a different country each year. Dates will vary as to climate conditions in the respective nations.

LABOR BRIEFS

Appalachian Electric Power Co, Kentucky Power Co, and Kingsport Utilities, Inc, employees have received a 5% wage increase effective April 1. Employees also received a four-week vacation after 25 years' service.

Tacoma, Wash., Public Utilities Board has granted a wage increase of $5 a week to its City Light journeymen electrical workers, represented by Local 483, International Brotherhood of Electrical Workers.

A series of special scholarships aimed at increasing the nation's supply of adequately trained secondary school science teachers has been established at the Massachusetts Institute of Technology, Dean T. P. Pitre, director of student aid, has announced. "The establishment of these new MIT scholarships, which we hope will encourage more students of science and engineering to prepare for teaching in the secondary schools," Pitre said, "is one of the steps we at MIT have taken to meet our responsibilities in this regard."



Sangamo Experiment . . .

Ultrasonics Clean Jewel Assemblies

Jewel assemblies for meters get an ultrasonic cleaning in this experiment at Sangamo Electric Co, Springfield, Ill. Emil F. Blase, chief chemist of the company, is shown here withdrawing a wire basket of jewel assemblies from the ultrasonic device.

Blase explained: "The violent vibrating action loosens contaminations such as grease, lint and metal debris from even the most minute recesses and interstices. This excellent cleaning process takes place without any physical destruction or residual chemical deterioration."

In this investigation, high frequency sound waves are directed through a water-soluble detergent, forcing the solution to cavitate or "cold boil" in all directions on the jewel assemblies.

If the experiment proves successful, Sangamo hopes to adapt ultrasonic cleaning to regular production practice for jewel assemblies and other instrument components.

B & W Backlog Increased, Shipments Big in '57, '58

At the annual meeting of Babcock-Wilcox Co, Alfred Iddles, president, revealed that the company had a current backlog of $286 million and would spend a record amount this year on expansion of its facilities. He said the backlog a year ago was $130 million. At the end of 1955 it amounted to $213,456,000.

Iddles said that orders increased in the latter part of 1955 and are coming in rapidly. Shipments will be relatively small in the first half of this year but will pick up in the latter part and will be big in 1957 and 1958. As a result, earnings for those years are expected to be better than those for 1956 and 1955.

At the same meeting stockholders approved a proposal for a three-for-one stock split. As a result the capital stock of the company will be increased from 3-million shares of no par value to 9-million of $9 par value. Stockholders will receive their additional shares on April 30.

B&W's capital expenditures authorized last year were $12,630,000 of which $9,800,000 will be spent this year, the firm's president noted.

Chance Buys Control of Porcelain Products

A. B. Chance Co, Centralia, Mo., has sold $1 million of common stock to finance the purchase of over 50% of the stock of Porcelain Products Inc, Parkersburg, W. Va. Stifel, Nicolaus & Co, St. Louis, headed the offering of 50,000 shares of A. B. Chance Co at $20 per share.

Net proceeds from the sale of the 50,000 shares will be used to retire approximately $900,000 of obligations of Chance's short term borrowings, according to F. G. Chance, president. Short term borrowings were partly used to acquire 9,132 shares of 18,124 outstanding shares of Porcelain Products.

In addition to 50,000 shares offered for sale, Chance is making an exchange offer to the remaining stockholders of Porcelain Products Inc for all the remaining outstanding shares of the company.

Lapp Insulator Announces 230-Kv Station Post Line

Lapp Insulator Co, Inc, recently announced a new series of station post insulators for h-v (196/287 kv) switch and bus use. The LeRoy, N. Y., firm listed six insulators with a nominal rating of 230 kv.

Three of the insulators have a BIL withstand rating of 900 kv. They are 80 in. high and are available with cantilever strengths of 910, 1,450 and 2,750 lb. The other three have a BIL level of 1,050 kv. They are 92 in. high and are available in strengths of 750, 1,170 and 2,300 lb cantilever.

(*More M & M on page* 59)

S&C Positect

gives

1 HIGHEST INTERRUPTING CAPACITY

2 FULL LOAD SWITCHING

3 SAFETY

These are the reasons so many large utilities—after exhaustive testing—have "standardized" on the Positect.

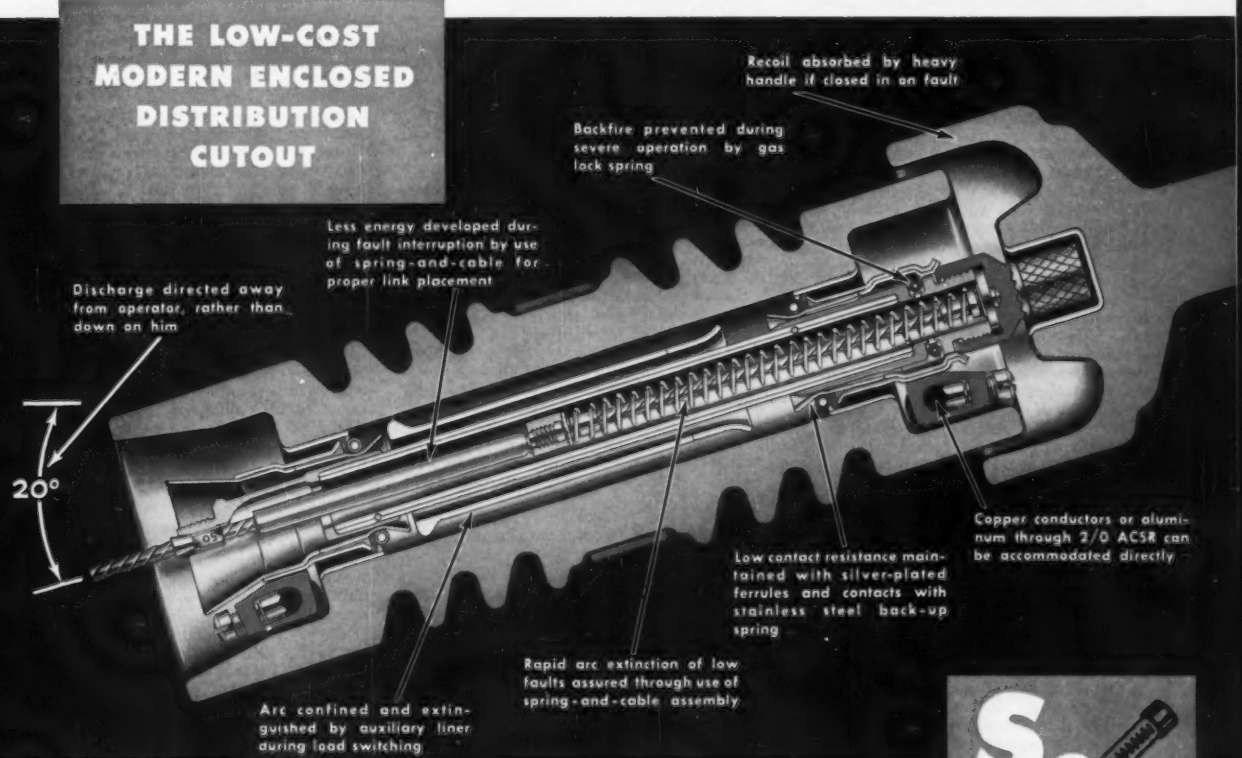
The high interrupting capacities—10,000 and 12,000 amperes assymetrical for the 50 and 100 ampere sizes, respectively—are backed up by 14,000 and 16,000 ampere one-shot ratings, matching the high faults on today's distribution feeders.

Full load switching—200 amperes of load current, and associated magnetizing and charging current—is positive and without external arcing. And—best of all—there's built-in safety for the operator. Hook stick operation is unnecessary.

For details on the many advantages of "standardizing" on the Positect, write for Catalog Sec. 520 . . . we will gladly send one.

Load switching is accomplished by removal and insertion of bayonet.

THE LOW-COST MODERN ENCLOSED DISTRIBUTION CUTOUT


Recoil absorbed by heavy handle if closed in on fault
Backfire prevented during severe operation by gas lock spring
Less energy developed during fault interruption by use of spring-and-cable for proper link placement
Discharge directed away from operator, rather than down on him
20°
Copper conductors or aluminum through 2/0 ACSR can be accommodated directly
Low contact resistance maintained with silver-plated ferrules and contacts with stainless steel back-up spring
Rapid arc extinction of low faults assured through use of spring-and-cable assembly
Arc confined and extinguished by auxiliary liner during load switching

Specialists in High-Voltage Circuit Interruption since 1910

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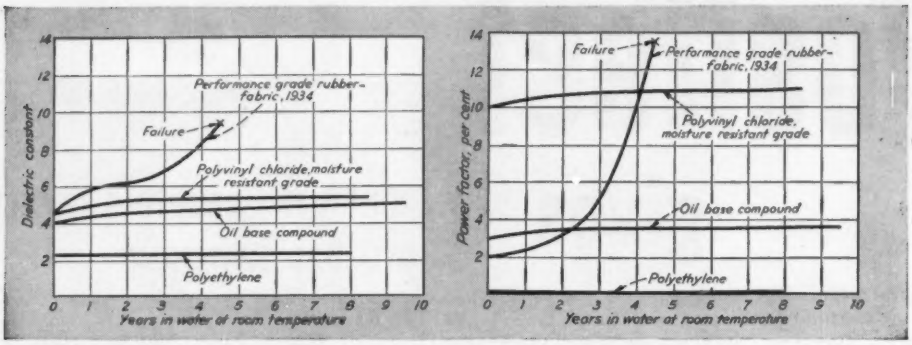
POWER FUSES • DISTRIBUTION CUTOUTS AND FUSE LINKS • LOAD INTERRUPTERS • METALCLAD SWITCHGEAR



CURRENT TRENDS

One of a Series

These graphs show some long-time 1000-cycle test results on typical insulations. Time consumed retards development of new types. The text explains limitations of accelerated tests and how interpretation is affected by application.

Moisture Resistance of Cable Insulations

In sharp contrast to the situation only 15 to 20 years ago, moisture need no longer be considered a serious hazard to cable operation.

Two factors have helped materially in the relatively rapid attainment of this present degree of protection: (1) New insulating materials and compounds have been developed which possess an inherent high degree of moisture stability; (2) Short-term laboratory test methods now help to evaluate moisture resistance correctly and thereby speed the development of the newer insulating materials.

Metallic sheaths—pro and con

A continuous metallic covering, such as lead sheath inherently provides complete moisture protection to the underlying insulation. But a metallic sheath is not always advisable or practicable. Hazards such as electrolysis, corrosion, vibration, plus added weight and economic factors often nullify its usefulness. This seems to be more the rule than the exception.

Because of these problems presented by metallic sheaths, attention turned to the study of the ability of the conductor insulation itself and nonmetallic coverings to withstand water and moisture. These studies involved the theories of mechanics of moisture attack, effects of environmental conditions, methods of test, and evaluation of insulating materials and coverings with particular relationship to actual performance and experience.

Theories

The mechanics of water absorption have been comprehensively investigated. While there is a lack of agreement in terms of actual operation, it is generally agreed that there are at least two physical methods by which water might affect insulation: by actual "absorption" and "diffusion."

"Absorption" is a direct layer effect in which the successive outer layers of the insulation gradually become water-soaked. Tests for increased weight or electrostatic capacitance of the dielectric reflect changes by absorption.

"Diffusion"—more difficult to measure—takes place when water permeates the insulation and establishes irregular conducting paths of water from the conductor to the outer surface. Its study involves additional parameters such as pressure and rate. A weight test would not disclose "diffusion" but some sensitive electrical quantity such as insulation power factor or resistivity might be related to it.

The effect of moisture upon cable characteristics can probably be best explained in terms of its electrical action which provides a direct determination. The insulating properties of a dielectric are adversely affected by the conducting properties of the water.

The determining feature for any insulation operating under an alternating current stress is its electrical stability. For as soon as its insulation becomes erratic under a particular set of circuit conditions, a cable's usefulness to that circuit is ended. For a power cable, complete electrical instability is reached when dielectric losses become excessive enough to permit actual thermal failure. For a communication cable, this point is reached when attenuation constants increase so much that an acceptable level or quality of signaling cannot be maintained.

In cable insulation it is not so much a question of "how much" water, as "where" it is. The ultimate criterion in the penetration of water through cable insulation, therefore, *is its effect upon the electrical stability of the cable—all other effects being of secondary importance.* The longer the electrical properties of an insulation remain relatively constant in the presence of water, the better is the true moisture resistance of that insulation.

Long-term unaccelerated moisture tests have been fundamental and helpful in adding to the knowledge of moisture absorption. But a minimum of two years' immersion period has usually been necessary to establish whether or not an insulation was truly electrically stable—and many such tests have been continued on many types of insulations for 5-year periods and longer. Something of a more practical nature was obviously needed and several short-term test methods, based upon electrical measurements were devised and found to give a relatively truthful index of moisture resistance.

Test methods

One such short-term test control is the temperature of the water bath. This has been found to have a substantial accelerating influence, although certain caution is needed in establishing a maximum test temperature that will not alter results because of chemical or physical changes. For most materials and purposes, a bath temperature of 50° C. has been found satisfactory. Further, the effects of thickness of insulation are reflected in the rate of change of electrical properties. Relatively thin walls (preferably not less than 1/32") will disclose the effects of water much sooner than heavier walls which may require several months immersion to indicate a correct trend of measurements.

In performing electrical measurements, an increase in the applied test voltage will generally cause a truthful "acceleration." For example, measurements of power factor and capacitance at 60-cycle voltages up to 80 volts per mil of insulation thickness provide a reliable means of testing insulated conductors intended for 60-cycle power service applications.

An electrical test which consists of measurements of 60-cycle capacitance and power factor at 40 and 80 volts per mil on cable specimens immersed in water at 50° C. is now the only moisture test recommended by IPCEA for power and control cables. It is sometimes called the Stability Test. Details and limits for this and other tests are set forth in the recent IPCEA wire and cable specifications, Appendix N—Method EM-60.

In conclusion

The various possible effects of moisture on insulation involve a careful analysis of the end use before choosing materials and design. But it is certain, at least, that specification of lead sheathed cable designs is no longer mandatory for wet locations. And there is no question that we are headed for still better moisture-resistant insulations—and better tools aiding our understanding of the problem of moisture.

For further study of this subject reference is made to a paper entitled, "What Moisture Resistance Means in Cable Insulation" by R. C. Graham, Chief Engineer, Rome Cable Corporation, which we will gladly send on request.

ROME CABLE CORPORATION, Rome, New York

Grooved Lamp Doubles Light Output

A fluorescent lamp, said to double light output of present tubes of the same length while maintaining efficiency, is being put into production by General Electric Co.

Lamp is an 8-ft, 2⅛-in. diam tube with a series of grooves hollowed lengthwise along one side. Idea of grooves is to diminish internal loss of energy before it can be turned into visible light. This loss is caused largely by absorption in the mercury vapor within the lamp. The grooves, say GE engineers, constrict the area within the tube, cutting the distance the radiation has to travel, thus allowing more of it to activate the phosphor and create light.

The new lamp, named "Power-Groove," will be used primarily for commercial-industrial, outdoor, and street lighting applications. It is rapid-start type and operates at about 200 w, or 25 w per ft. Present 8-ft high-output, rapid-start lamp operates at 105 w or 13 w per ft.

Samples will be available in June, but the lamp is not expected to be ready for market until sometime in the fall. It will operate in new installations only and is not interchangeable with any other lamps. A companion 100-w, 4-ft lamp will be produced, and a 6-ft lamp for street lighting probably will be added.

"It gives about twice the 900 lumens per ft delivered by the most efficient lamps we have at present," said company officials. "We look for it to double lighting levels over the next 15 years." GE expects it to extend materially fluorescent lighting into areas heretofore dominated by incandescent and mercury lamps.

MANUFACTURERS' EARNINGS

COMPANY	PERIOD MONTHS	ENDING	NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
Aluminum Co of America	12	Dec. 31	$87,600,808	$61,875,155	$4.18	$2.95
Baldwin-Lima-Hamilton	12	Dec. 31	3,656,453	4,066,020	0.84	0.95
Corning Glass Works	12	Dec. 31	18,626,671	17,490,191	2.76	2.59
Cutler-Hammer	12	Dec. 31	5,629,703	4,093,050	8.53	6.20
du Pont de Nemours, E. I.	12	Dec. 31	431,555,884	344,386,015	9.26	7.33
Electric Storage Battery	12	Dec. 31	2,585,081	7,787,974(q)	2.90	8.58(q)
Elliott Co	12	Dec. 31	1,028,132(j)	1,724,695	1.38	2.67
General Cable Co	12	Dec. 31	6,547,558	5,219,933	2.73(a)	2.31(a)
Kennecott Cooper	12	Dec. 31	125,516,291(i)	77,906,288	11.60	7.20
Kidde & Co, Walter	12	Dec. 31	494,253	1,124,031	1.02	2.61
Minneapolis Hon. Reg.	12	Dec. 31	19,278,648	15,345,203	2.98	2.42(s)
Motorola, Inc.	12	Dec. 31	8,490,539	7,572,024	4.39	3.91
Okonite Co	12	Dec. 31	1,559,497	1,171,899	8.18(a)	6.54(a)
Phelps Dodge Corp	12	Dec. 31	72,319,224(n)	41,249,391(n)	7.13(n)	4.07(n)
Pittsburgh Steel	12	Dec. 31	7,515,470	2,170,694	4.31	0.60
Sangamo Electric Co	12	Dec. 31	2,731,978	1,600,944	3.41	2.00
Shell Oil	12	Dec. 31	125,531,950(u)	121,126,546	4.56(a)	4.41(a)
Socony Mobil Oil Co	12	Dec. 31	207,434,017	183,805,995	5.93	5.25
Standard Oil Co (Indiana)	12	Dec. 31	157,117,828	117,156,768	4.81(b)	3.73(b)
Sylvania Electric Products	12	Dec. 31	13,812,970	9,480,941	4.29(a)	2.92(a)
Westinghouse Elec Corp	12	Dec. 31	42,802,747	79,921,732	2.46(a)	4.78(a)

(a) Based on shares outstanding at close of period. (b) Based on average number of shares outstanding during the period. (i) After provision of $11,903,585 for flood and rehabilitation expenses. (j) Includes $499,168 special credits. (n) After depletion. (q) Includes net profit of $8,616,463 on $9.49 a share from sale of investment in English subsidiary. (s) After giving effect to a 2-for-1 stock split in April, 1955. (u) Includes net profit of $6,114,482 equal to $0.22 a share, on sale of Shellane assets.

M&M BRIEFS

Oak Ridge Operations of the Atomic Energy Commission reported that 45 representatives of 23 firms and organizations visited facilities during March under the Commission's access permit program. In addition 225 representatives of 165 firms and organizations attended a two-day classified conference on the homogeneous reactor program.

Westinghouse Electric Corp developments:

- Wheeling Steel Corp will be supplied with the motor drive, totaling 21,000 hp, for a Magamp-controlled five-stand tandem cold reduction tin plate strip mill at Yorkville, Ohio.
- Plans are progressing to build the nuclear materials testing reactor on a 800-acre site near Waltz Mill, Pa., instead of at Blairsville, Pa., as announced previously. The purpose—"to bring the reactor closer to the company's other atomic power activities." Construction of the 20,000 kw reactor is scheduled to begin Sept. 1, 1956 and the estimated date of completion is Aug. 1, 1957.

Aluminum Co of America is using officially Alcoa Research Laboratories as the name of the company's research branch at New Kensington, Pa. This light metals research facility was founded in 1918. A broadened scope of activities prompted the name change, according to ARL Director Dr Kent R. Van Horn.

Anaconda Wire & Cable Co is installing extensive equipment for production of paper-insulated, lead-covered telephone cable. The new facilities are expected to be in production during the second half of this year.

Compco Corp, Chicago, Ill., manufacturer of fluorescent and incandescent lighting fixtures, has purchased the Lighting Division of Mitchell Mfg Co, Chicago. Sale price was reported at approximately a half-million dollars. Mitchell will concentrate on development and production of air conditioners.

Grip Nut Co, manufacturer of lock nuts, has moved its Chicago sales offices to larger quarters in the main plant at South Whitley, Ind.

BUSINESS OUTLOOK

Electrical World
APRIL 23, 1956

The Federal Reserve's renewed concern about inflationary dangers is shown in the approval of a further rise in the discount rate. This is the fifth within a year: in that time it's gone from 1½% to 2¾%. Two districts, San Francisco, and Minneapolis are up to 3%. Others may follow suit before long.

Reasons for the action are not far to seek. Price trends in raw materials and industrial manufactures continue upward. Moody's index of spot commodities, and the BLS index of industrial raw materials have risen close to 1% in the last week. Scrap steel prices have risen 12% in the last month. **What's more, even agricultural prices appear to be moving up again.** Thus wheat prices, and the BLS index of foodstuff prices have risen around 5% in the last month. Hitherto, declining agricultural prices have stabilized living costs, by offsetting rising industrial prices. You can't count on this pattern continuing any longer.

• • •

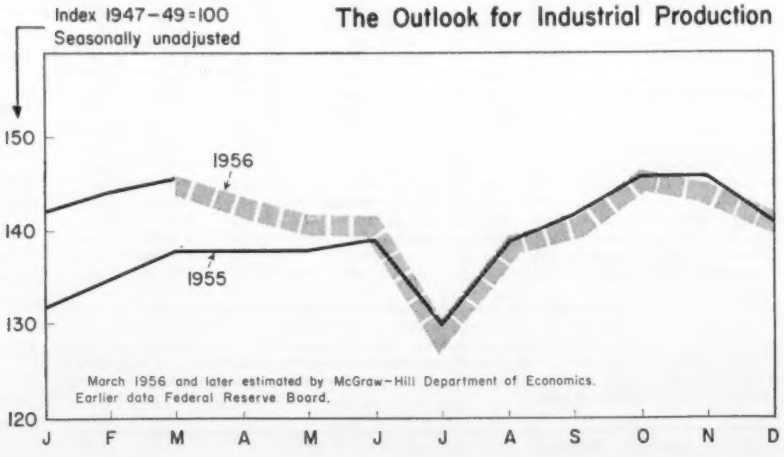
There's concern, too, about speculative inventory formation. Manufacturers' inventories rose at an annual rate of $6 billion in February, and probably at an annual rate of at least $5 billion for the first quarter as a whole. That's too fast to be healthy: perhaps four times a normal sustainable rate of growth. And this does **not** include the abnormally high car stocks in dealers hands.

Effects of the hike in the discount rate won't be dramatic. An extra ¼% won't deter a speculator who expects prices to keep rising fast. And it will hardly be considered by the legitimate industrial investor who expects to earn 10 to 15% on a long term project. But the banks may find it an excuse to turn down more marginal loans, and some State and local government long-term projects (such as toll roads) may decide to defer financing until money eases up a bit. **Biggest effect will likely be psychological:** a dampening of speculative fever. Essentially it's kid-glove treatment. Hiking reserve requirements would be quite another story. But there's no sign anybody's thinking of going that far.

• • •

One upsetting possibility you should not overlook is a war in the Middle East. Odds being offered are now respectable enough (reported as 2 to 3) so you have to consider seriously what it might mean. If it started a wave of scare buying it could be 1950 all over again.

The Outlook for Industrial Production



SELKYD–a new kind of plastic improves watthour meter base plates

and Sangamo brings it to you!

In order to find the ideal material from which to mold watthour meter base plates, Sangamo and Glaskyd, Inc., pooled their efforts.

The result is Selkyd.*

A Selkyd base plate on a watthour meter has many advantages. It resists corrosion. It has a high resistance to arc tracking. Having great impact strength, a Selkyd base plate will stand up to physical punishment. And because Selkyd is an inert organic substance, base plates made from it have great dimensional stability.

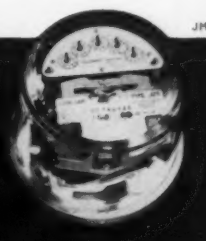
Adoption of this Selkyd base has in no way altered the electrical characteristics of the J2.

Every Sangamo J2S meter you buy will come to you with a base plate made from this remarkable new plastic . . . and at no extra cost.

Selkyd base Sangamo meters will be shipped to you sealed. You'll find them so accurately calibrated . . . so solidly built . . . that no adjustment is necessary.

**A thermosetting resin combined with glass fibers—in contrast to ordinary phenolics having wood fibers as a filler.*

JM56-3



SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

IN THE INDUSTRY

Is LP Gas Rival or Foe In Rural Market?

Bottled gas industry registers big increases in 1955. Utility survey shows one out of three farm customers uses gas. It's time to size up the competition

How much longer can electric utilities afford to treat liquid petroleum gas as a friendly rival? A number of men in the rural sales field think it's time to draw the battle line and start slugging. Otherwise, they hint, competitive gas appliances and equipment will bottle up electric power sales in the rural areas.

This thought was expressed a number of times at the recent Edison Electric Institute Sales Conference (p 16). J. C. Cahill, supervisor of rural sales, Detroit Edison Co, reported that a survey conducted by seven widely scattered utilities showed that nearly one out of three utility customers is using LP gas. He also noted that a leading gas publication had reported record gains for the LP industry in 1955.

The gas dealers have a double incentive for pushing sales, commented Cahill, for they nearly always sell appliances as well as fuel. Cahill believes there are three ways open to lick the competition: **1.** Give the customer better service. **2.** Educate the farmer to the ultimate savings in terms of labor, convenience, and dependability. **3.** Make the farmer more aware of the need for wiring adequacy.

More outspoken in this call for battle was W. J. Ridout, Jr, editorial director of "Electricity on the Farm." He called the bottled gas industry "a giant in our competitive forces" and estimated that LP gas is costing the electric utilities $10 million in farm revenue each year for cooking alone.

"The LP gas industry has a program to check your growth," Ridout told the EEI Farm Section, "and we must admit that it has been very effective."

He noted that the bottled gas was making big gains among the "twilight" farmers—those between the city limits and the full size farms. Whether by design or not, these gas customers become prime prospects in any expansion of natural gas lines.

Discussion during and after the farm sessions further supported the need for a more aggressive program to meet the gas competition. But time after time the question came up: How can utility promotion keep pace with the hard sales of the gas people. They can push a specific product, demonstrate it, even put it out on trial. In many areas the utility salesmen must sell an idea, clear roadblocks of inadequate wiring, and depend on dealers to make the actual sale.

Cahill came nearest to the answer, "We must outfight the competition through even closer utility-dealer-contractor alliance."

Another part of the answer seemed to be that farm power salesmen will have to make their promotion look more like selling.

TECHNICAL NOTES

Fission products of a reactor, if inhaled or ingested, are from 3 million to 2 billion times more toxic than chlorine, the most potent industrial poison.

Large generating units require system planning further in advance to disclose more numerous system bottlenecks and evaluate the varied alternate solutions.

Glass as a lubricant stopped die erosion from the extrusion of hot steel—merely another example of the strange revelations of persevering research.

Maintenance cost in a nuclear plant will be 1½ to 2 times that of a conventional steam power plant.

Generating units of 7 to 10% system capability give most economical system expansion pattern as long as their forced outage rate remains 2% or under.

Control of electric heat is so precise that two 8,000-ton presses in a U. S. Air Force plant can be made to extrude aluminum billets at a rate of less than one inch per minute.

Lack of water storage in a supercritical boiler makes feed pump availability supercritical also.

Longitudinal seam of welded-seam main steam piping is subjected to twice the stress that a line joint has to withstand.

Circular building design enables a hydro station to withstand tail-water floods while its units continue operating under remote control.

Interconnecting two areas by transmission ties equal to the largest unit cuts generation expansion cost 10 to 15% by dropping reserve requirements.

Indiana PSC Reverses Rate Order

In an order dated Mar. 9, 1956, the Public Service Commission of Indiana reversed the position it took in a prior order dated Oct. 28, 1955 when it denied a proposed rate increase to the Public Service Co of Indiana. Proceeding arose from an order by Hendricks County Circuit Court for rehearing in case.

Different Material Submitted

The PSC, after noting that the record transmitted by the court contained material which was of a substantially different nature, went on to say: "In its transmittal order in this cause the court found that 'substantially all such evidence is materially different.'

"It is unfortunate, in the progressive development of the regulatory process, that the administrative body charged with the responsibility of fixing the rates, values, and returns for public utilities does not always have in the first instance the benefit of the comprehensive presentation of evidence subsequently provided the court. The failure of public utilities to properly and comprehensively discharge their statutory burden before a regulatory body, either voluntarily or through ineptitude, could serve to impair an otherwise temperate regulatory climate."

The PSC, with respect to the fair value findings, increased the rate base from $302.5 million—which it found in the earlier case—to $320 million in the instant proceeding. However, in the interim, the company added $10,648,944 of net plant (i.e. between 5/31/55 and 12/31/55).

Fair Value Rate Bases Cited

Thus, while in the earlier order the fair value rate base was only 7% over net original cost plus materials and supplies, the PSC finding on the rehearing found the fair value rate base only 8.7% over net original cost, or 1.7% points more than before the new evidence was presented to the commission.

With respect to the fair return on the present fair value of the property, the PSC in discussing the evidence of one expert witness said: "This commission, however, has previously, on occasion, been called upon to point out that there is no established economic formula sufficiently authoritative to be universally applied for a determination of a proper return in a particular instance. Even one's business judgment of a proper return is influenced from day to day and from month to month by quotations of the money market, by quotations of securities, by reports of dividends, by market conditions, and by good or bad times generally.

"The ordinary conception of the regulatory process, therefore, leaves the determination of a fair return to the regulatory body, who, in the last analysis, must strive for the ultimate goal of permitting the utility involved to provide adequate service to the largest number of citizens at reasonable costs . . . we, therefore, believe that ultimate determinations on the subject of fair return are not susceptible of proof by expert opinion."

Fair Return Essential

The PSC continued: "In view of the foregoing conception that fair return is essentially, in the final analysis, a judgment figure based upon questions of fact, the solution of which calls for the exercise of sound judgment and common sense, the commission finds that a fair return for the petitioner on its used and useful public utility property devoted to the service of the public at Dec. 31, 1955, is $18,250,000."

This return, when related to the fair value of the property, amounts to 5.7% and 6.2% when related to the net original cost of the utility.

In dealing with the amount and propriety of net operating income, the treatment of deferred federal income taxes arising under the liberalized depreciation provisions of Section 167 of the Internal Revenue Code of 1954 had to be considered in the determination of rates.

The PSC said: "By testimony of the public's witness, the question of whether deferred federal income tax should operate as a charge against net operating income was posed. In the final determination of present net earnings this is a substantial item, amounting to $2,609,000, and the decision in this matter, when equated to gross dollars of revenue, would amount to nearly $6 million in the rates. The accounting procedure used in connection with these items in recording tax deferrals is a subject of the commission orders in Cause Nos. 25311 and 25842. These orders state specifically in their ordering paragraphs that "said accounting procedure shall not be, and shall not be deemed to be, controlling of said accounting procedures for rate-making purposes."

New Capital Requirements

The commission continued significantly that "In the original proceedings in this matter before the commission the item of $2,609,000 was allowed as a charge against net operating income, and will be so allowed in the consideration of net operating income in respect to new evidence. The commission is not, however, unmindful that such accumulations provide large amounts of interest-free capital and in some way, depending on the magnitude of such charges, tend to satisfy requirements for new capital and, in an over-all consideration of capital costs, have the general effect of reducing that capital cost. We are not of the opinion, however, in this cause that we should take the position that such charges to net operating income should be disallowed, for this would tend to set aside the stated desire of the Congress of the United States when it provided for such tax relief. The commission understands it was the intent of the Congress to stimulate the expansion of the nation's industry by providing such interest-free funds, thereby taking some of the pressure for capital off of national markets.

Future Liabilities Raised

"We think it is equally discordant, however, with simple economics to refer to such items as future liabilities, as the petitioner has done frequently in this cause. In the orders relating to the accounting of such matters hereinbefore referred to, we

have restricted the use of such funds only to the extent that they may not be paid out in dividends to the common stockholders of the company.

"The funds generated by such deferrals," the order said, "are available for every other purpose, including the payment of excessive maintenance charges, the construction of plant, on which the utility could then seek to earn, as it does in this cause, higher rates, and for the payment of capital costs other than equity costs.

"Having reviewed all of the evidence transmitted by the court relating to net operating income at Dec. 31, 1955, the commission finds that the net operating income at a level of operations of Dec. 31, 1955, of the petitioner was $16,531,143. These earnings are insufficient to provide the fair return herein found, and the petitioner should, therefore, be authorized to increase its net operating income in the amount of $1,718,857," the order said.

REGULATION BRIEFS

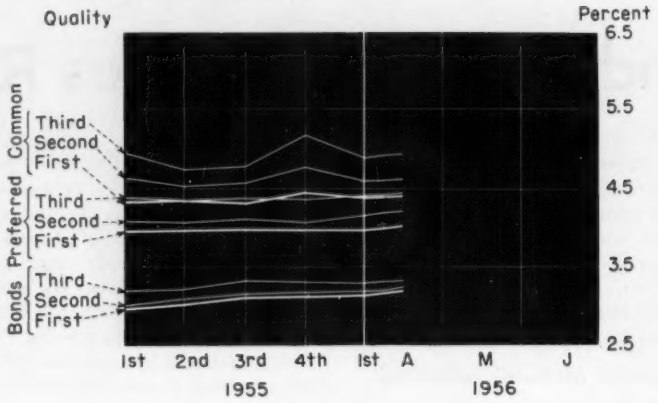
Dayton Power & Light Co has issued a booklet "The Two-Word Enigma . . . Rate Base". It answers the questions—"What is it?, Who benefits from it?, Why have one?, and What kind is best?" For copy, write S. J. Schiml, comptroller, Dayton P&L, 25 North Main St., Dayton 1, Ohio.

Mississippi House of Representatives has voted 119 to 4 to put private electric power and natural gas companies under state regulation of rates and services by the state public service commission. Under the bill franchises will still be left to the cities.

Smoky Hill Electric Co-operative Association, Inc, has received Kansas Corporation Commission approval to decrease rates by approximately $6,814 a year.

Indiana Public Service Commission Chairman Warren Buchanan has said that it is likely that a bill will be introduced in the 1957 Indiana Legislature to tighten the state utility regulatory law and force utilities to limit their evidence in court appeals in rate cases to that information which they presented to the Public Service Commission.

Today's Utility Yields (%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY.....	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
April 12.....	3.20	3.24	3.33	4.03	4.22	4.47	4.41	4.63	4.95
April 5.....	3.18	3.21	3.32	4.01	4.22	4.45	4.42	4.61	4.94

Utility Earnings

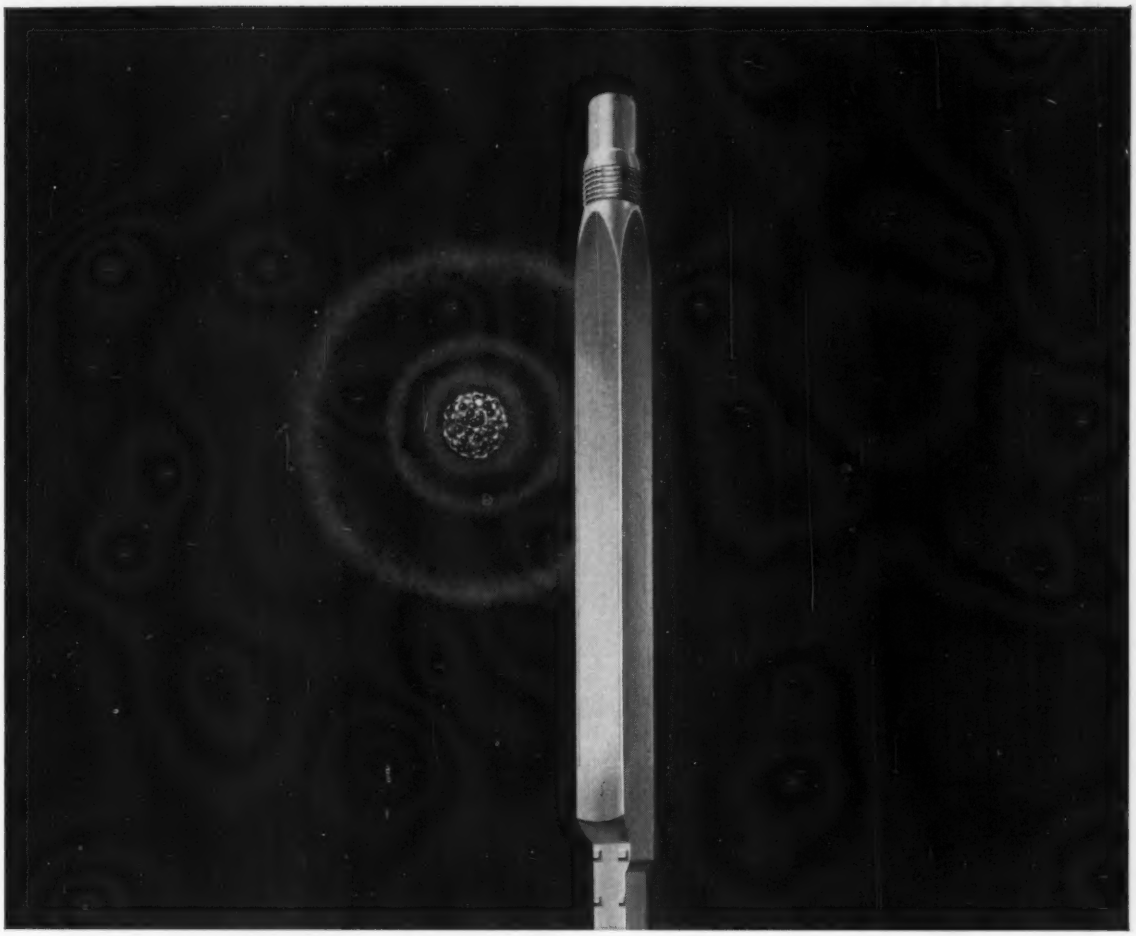
COMPANY	PERIOD MONTHS	ENDED	NET INCOME 1956	NET INCOME 1955	EARNINGS PER COMMON SHARE 1956	EARNINGS PER COMMON SHARE 1955
Arizona Public Service.....	12	Feb.	$5,509,000	$4,824,000	$1.42(a)	$1.46(a)
Baltimore Gas & Electric.....	2	Feb.	3,888,000	3,093,000	0.58	0.50
California-Pacific Utilities.....	12	Feb.	709,077	638,080	2.20(a)	2.16(a)
Central Maine Power.....	2	Feb.	1,093,248	1,301,094	....	....
Consumers Power.....	12	Feb.	29,866,216	26,724,767	3.25(a)	2.98(a)
Detroit Edison.....	12	Feb.	26,459,711	23,007,769	2.43(a)	2.13(a)
Iowa Southern Utilities.....	12	Feb.	1,390,583	1,292,140	1.69	1.56
Ohio Edison, consolidated.....	12	Feb.	23,719,779	20,766,327	3.61	3.10
Pennsylvania Power & Light...	12	Feb.	22,454,362	21,287,353	3.15	2.96
Portland General Electric.....	12	Feb.	5,130,316	4,493,726	1.71	1.50
Public Service of New Hampshire.....	12	Feb.	4,170,665	3,947,831	1.26(a)	1.35(a)
Tampa Electric.....	12	Feb.	3,493,228	3,126,881	1.41(b)	1.43(b)
Texas Electric Service.....	12	Feb.	11,123,992	10,316,281	....	....
Texas Power & Light.....	12	Feb.	10,702,150	10,129,606	....	....
Texas Utilities, consolidated...	12	Feb.	24,710,136	23,001,431	2.02(c)	1.95(c)

Notes—(a) Based on average shares; (b) Based on 2,172,855 shares in 1956 and 1,975,323 shares in 1955, and (c) Based on 12,210,000 shares in 1956 and 11,810,000 shares in 1955.

Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
APRIL 12–18			
BONDS			
Southern California Edison—1st mtg 3⅝% due 1981..	$40,000	99.106%	3.68%
COMMON STOCK			
New England Electric System—834,976 sh (being offered commonholders on 1-for-12 basis, record April 18 to expire May 4).....	$13,360	$16.00	6.25%
SCHEDULE FOR APRIL			
BONDS			BID DATE
Wisconsin Electric Power—1st mtg due 1986.....	$30,000	.....	April 24
PREFERRED STOCK			
Long Island Lighting—120,000 sh.....	$12,000	.....	April 26(a)

Note—(a) Blyth & Co.—First Boston Corp. and W. C. Langley & Co.



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STATISTICS

Internal Sources Provided 43% of Private Utility Construction Funds in 1955

(Millions of Dollars)

	1955	1954	1953	1952	1951	1950
Net increase in value of electric plant	2,296*	2,512	2,657	2,233	1,819	1,647
Gross Construction Expenditure	2,719	2,835	2,876	2,599	2,134	2,050
Source of Internal Funds						
Depreciation	701	634	565	513	475	438
Surplus	320	270	252	224	164	205
Other (a)	145	130	80	50	50	50
Total Internal Funds	1,166 (43%)	1,034 (36%)	897 (32%)	787 (31%)	689 (32%)	693 (36%)
Sales of Securities						
Common Stock	352	354	537	421	339	273
Preferred Stock	195	255	223	194	172	238
Total Stock	547	609	760	615	511	511
Long Term Debt Issued	1,006	1,241	1,193	1,116	985	736
Total Securities Sold	1,553	1,850	1,953	1,731	1,496	1,247
Total Visible Funds	2,719	2,884	2,850	2,518	2,185	1,940

(a) Sales of assets, other reserves reinvested in plant, unamortized debt discount and expense.

* Preliminary.

Source: Edison Electric Institute.

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Feb.	115.59	114.55	103.74	11.4
Peak—Class I Systems (million kw)	Jan.	95.8	98.2	84.1	13.9
Estimated Dec. '56 Peak (million kw)	Jan.	105.45	105.27	102.56	2.8
Production—billion kwhr	Feb.	47.99	51.12	40.23	19.3
Hydro		10.63	9.36	8.57	24.0
Fuel		37.36	41.76	31.66	18.0
Sales—billion kwhr	Jan.	46.32	45.19	39.47	17.4
Residential		13.41	12.25	11.76	14.0
Commercial		7.00	6.81	6.24	12.2
Industrial		23.57	23.75	19.31	22.1
Other		2.34	2.39	2.15	8.8
Fuel Consumption	Feb.				
Coal—million tons		13.44	15.22	11.09	21.2
Oil—million barrels		7.10	8.22	7.43	−4.4
Gas—billion cu ft		67.81	68.27	63.63	6.6
Net Income Class A & B Co's—$ million	Jan.	127.26	125.72	112.21	13.4
Residential Customers—millions	12 mos.	44.41	44.30	43.14	2.9
Revenue per kwhr	ended	2.64¢	2.65¢	2.69¢	−1.9
Avg kwhr per customer	Dec. 31	2,751	2,728	2,549	7.9
Avg annual bill		$72.63	$72.29	$68.57	5.9

Business Statistics . . .

Indexes: 1947—49 = 100					
FRB Industrial Production	Mar.	145	144	138	5.1
ENR Construction Cost	April	143.2	142.8	135.7	5.5
BLS Cost-of-living	Feb.	114.6	114.6	114.3	0.3
NEMA Sales	Jan.				
Insulation materials		159	160	132	20.5
Electric appliances		105	101	108	−2.9
Wholesale prices	Jan.				
Motors and generators		126.5	126.5	121.6	4.1
Transformers and regulators		131.2	131.2	128.1	2.4
Switchgear and fuses		147.5	147.5	135.3	9.0
GNP—annual rate—$ billion	4th Qtr.	397.3	392.0	367.1	8.2

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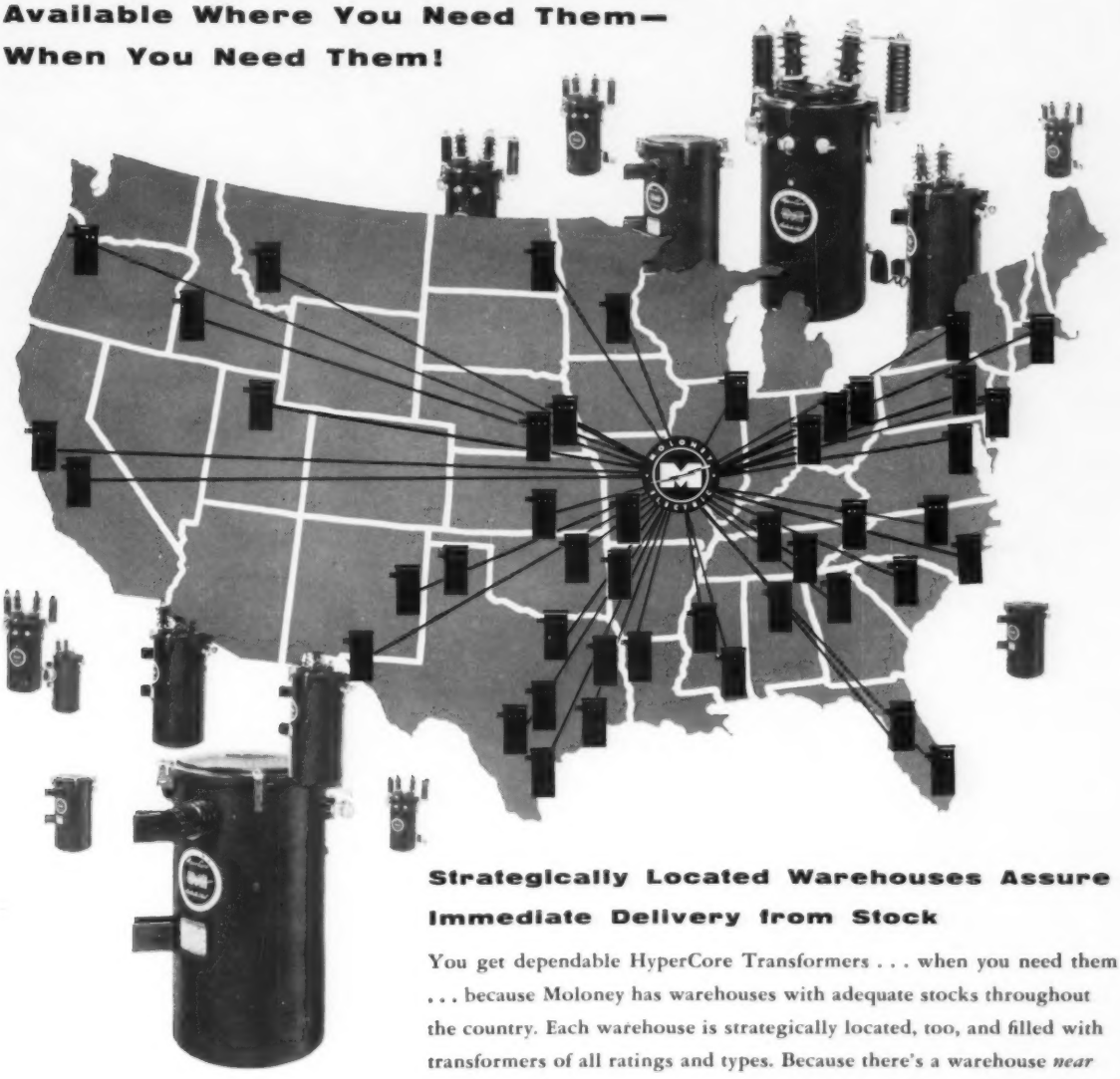

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